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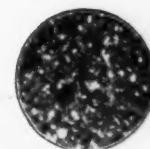
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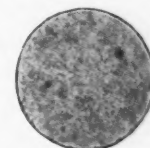
Cross-section of ordinary steel magnified 1600 areas showing coarse structure



Cross-section of high-quality steel magnified 1600 areas showing very fine, even structure



Cross-section of ordinary porcelain magnified 1600 areas showing coarse structure.



Cross-section of Champion 3450 porcelain magnified 1600 areas showing very fine, even structure

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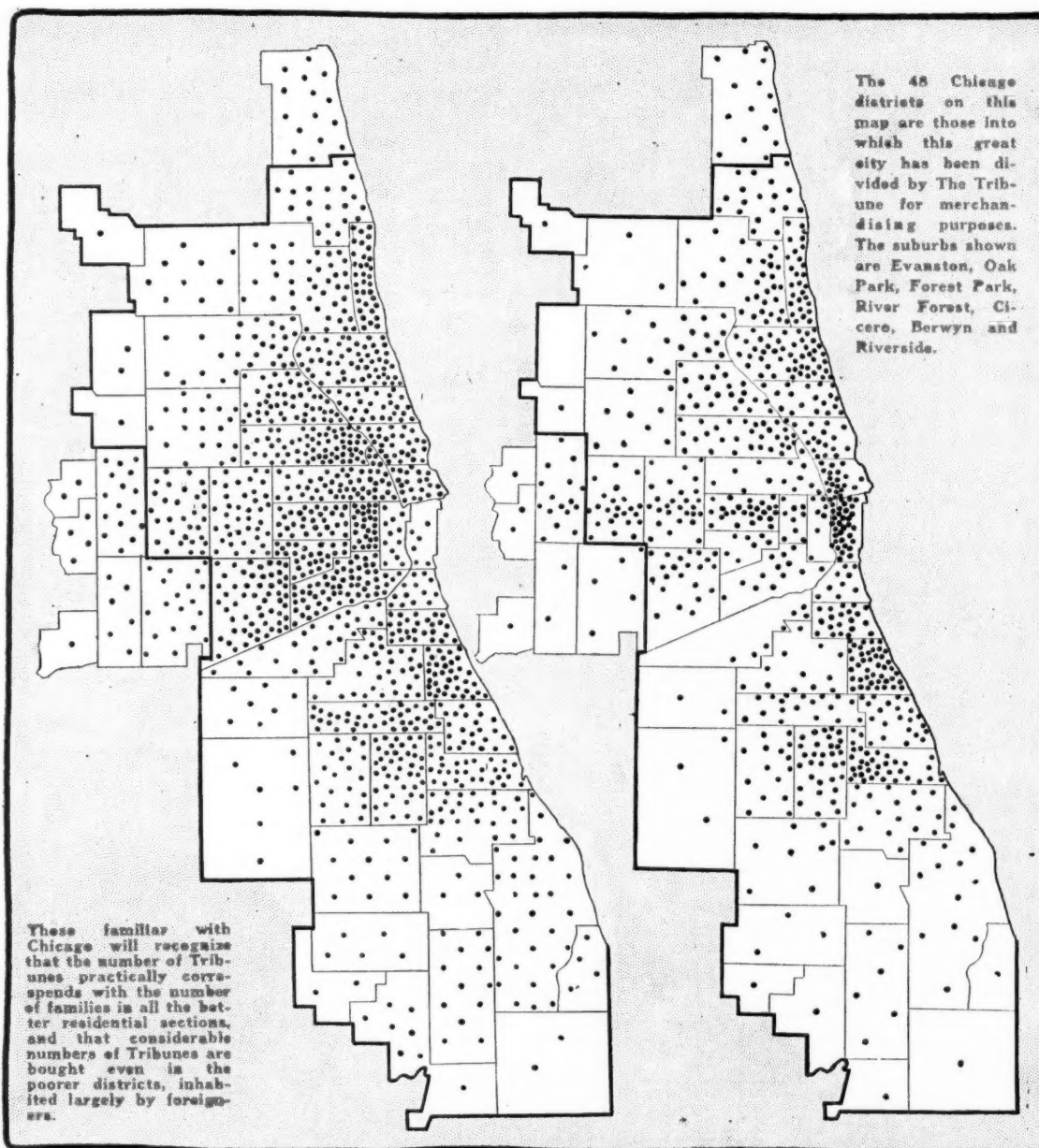
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AUTOMOTIVE INDUSTRIES

The AUTOMOBILE

VOL. XLIII

NEW YORK—THURSDAY, AUGUST 26, 1920

No. 9

7,904,271 Motor Vehicles in Use in United States

A gain of over a million and a half since one year ago is recorded by July registration figures: a car for each 13.52 persons in country. Ohio leads in registrations as well as in presidential candidates. West Virginia has largest percentage of gain.

OVER a million and a half more motor vehicles were in use in the United States on July 1, 1920, than on July 1, 1919. Registration figures for the middle of the present year show a total of 7,904,271 motor vehicle licenses in force. Every state except Montana has played some part in piling up this big increase, but Ohio, not content with being the home of the next President, has taken the lion's share of glory in automobile registrations, with an increase of 102,174 over the July 1 total of 1919. The number of registrations this mid-year is nearly 25 per cent more than last July. Thus a substantial gain is registered, both in percentage and in actual numbers.

On the basis of the present figures there is a car for every 13.52 persons in the United States, a remarkable showing in view of the fact that nine states present totals less than those of Jan. 1, 1920. When it is considered that every one of these nine delinquents is likely to go over the top before the end of the present year, it becomes evident that there may be a car for every 10 persons before many months have passed. This is especially interesting when the registration articles of a few years back are re-read, and it is noted that the writers were stretching actual car-capacity somewhat to say that in a single state every

person could go automobile riding at the same time. At the present rate of increase it will not be many years until that statement is true of the United States as a whole.

Only one state failed to register a gain for the year. Montana shows 1,320 less registrations than last July, a decrease of about 2.5 per cent. This probably reflects a financial condition due to dry summers and extremely cold winters in that section. In looking forward to what the final total for 1920 may be, it is interesting to note that five states showed a decrease last July, but that all of them had a decided increase at the end of the year. The present figures indicate that the total registration for the United States is certain to pass the 8,000,000 mark before Jan. 1, 1921.

Ohio leads in the total number of vehicles registered with 567,000, leaving behind New York, the former leader, by many thousands. New York's displacement can be accounted for partly by the fact that it has actually lost ground since the beginning of the year, a tendency similar to that which appeared last year in the figures of that state. This is probably due to lax enforcement of the registration law in certain portions of the state until after the crops are harvested. Last year a substantial increase for the entire year was recorded after a decrease, similar to that of this

year, had been shown on July 1. Only by taking the lax law enforcement into consideration can the figures of several states be explained.

Aside from Ohio's supremacy, the advance of Pennsylvania from third place a year ago to second place this year is of interest. The Keystone State increased 98,162, passed the 500,000 mark and took its place second to Ohio with a total registration of 506,085.

West Virginia shows the largest percentage of increase in motor

vehicles, having 55 per cent more than at this time last year. The state to make the largest gain last July was Tennessee with 29 per cent. As might be expected, those states which last January had the largest number of persons per car show the largest percentage of increase. Among the dozen leaders in this respect, seven appeared among the last 12 in the "Number of Persons Per Car" tabulation on Jan. 1, 1920. Among the states which already had a considerable number of cars in proportion to population, Oklahoma records the most surprising increase. Although this state had but 19 persons per car in July, 1919, it increased 45.53 per cent during the year, being behind only West Virginia and North Carolina in percentage of increase.

The gain in total registration made by Missouri is worthy of mention. This state came up from fourteenth to twelfth, passing Massachusetts and its neighbor Kansas on the way. Although California shows only a 20 per cent increase and has not yet reached its Jan. 1, 1920, total, it maintains the same relative position which it held last year in the total registration column. Iowa and Michigan follow in the same position as in 1919, but Texas has jumped ahead of Minnesota.

In July, 1919, only 18 states had passed 100,000 in registrations, while the current tabulation shows 24 over the century mark. Nevada is again the only state which has not yet reached 10,000, but may be expected to run into five figures by the end of the year.

Thus far the comparisons have been made with the figures for July 1, 1919, since those figures are the ones with which the present tabulations should logically be compared. Mid-year figures are not commensurable with end-year figures. Two such sets cannot properly be compared in the same way that similar sets of figures, both for the mid-year or both for the year-end, may be. Where a state at the mid-year mark, however, has surpassed the year-end total of the previous year, that fact is of interest, because it makes certain some gain for that state at the end of the year.

Where a state has failed to reach the previous year-end total, however, no significance should be attached to that fact, since it may be attributable to certain local influences, as in the case of New York, or to peculiarities of local laws, or to some similar circumstance. It does not indicate in any way what the next year-end total for that state is likely to be. New York, for instance, after registering

a large drop in registration at the July reckoning last year, picked up strongly during the remaining months and pushed Ohio out of first place on Jan. 1. The same thing is likely to happen again this year.

With this idea in mind, that the same sort of comparison is not possible between the present figures and the Jan. 1 figures, as between these figures and those for last July, both comparisons are printed as a matter of interest.

Ohio is shown to have had the

Cars and Trucks in United States July 1, 1920

Ohio	567,000
Pennsylvania	506,085
Illinois	497,318
New York	486,262
California	421,327
Iowa	405,182
Michigan	351,762
Indiana	302,308
Texas ..	298,234
Minnesota	295,898
Wisconsin	280,452
Missouri	258,478
Kansas	253,896
Massachusetts	233,258
Nebraska	212,130
New Jersey	195,258
Oklahoma	181,200
Washington	143,561
Georgia	137,129
North Carolina	123,000
South Dakota	114,408
Colorado	111,907
Virginia	105,000
Connecticut	100,550
Kentucky	94,065
Tennessee	90,774
Oregon	89,933
South Carolina	80,562
North Dakota	76,953
Maryland	75,700
Alabama	72,426
West Virginia	70,088
Florida	67,118
Louisiana	61,967
Mississippi	57,000
Arkansas	56,862
Montana	52,100
Maine	51,783
Idaho	46,360
Rhode Island	44,000
District of Columbia	43,329
Utah	37,261
New Hampshire	30,415
Arizona	29,803
Vermont	26,636
Wyoming	21,250
New Mexico	20,300
Delaware	16,600
Nevada	9,383

Total.....7,904,271

Increase in Registration Over July 1, 1919

Ohio	102,174
Pennsylvania	98,162
Illinois	95,947
Iowa	85,682
Michigan	78,366
California	71,593
Wisconsin	67,962
Minnesota	66,328
Missouri	56,994
Oklahoma	56,699
Indiana	56,308
New Jersey	50,495
New York	49,330
Texas	48,888
Kansas	47,863
North Carolina	43,525
Nebraska	29,130
West Virginia	25,069
Oregon	24,516
Colorado	23,592
Massachusetts	23,195
Virginia	23,000
South Dakota	22,600
Georgia	21,675
South Carolina	21,562
Kentucky	18,806
Florida	18,520
Washington	18,342
Rhode Island	17,888
Mississippi	17,601
Alabama	17,384
Louisiana	15,847
Connecticut	15,350
Arkansas	13,624
Idaho	10,543
Maine	8,127
Tennessee	6,774
Utah	6,501
Arizona	5,505
District of Columbia	5,401
Vermont	4,542
New Hampshire	4,185
North Dakota	3,938
New Mexico	3,425
Wyoming	3,050
Delaware	2,400
Nevada	1,230
Maryland	110
Montana (decrease)	1,320

Total.....1,508,398

Registration of Cars, Trucks and Motorcycles, July 1, 1920

STATE OR TERRITORY	Total Car and Truck Registrations	Non-Resident and Re-registration	Passenger Cars	Commercial Cars	Motorcycles	Chauffeurs and Operators Registered	Total Fees
Alabama.....	72,426	.....	60,319	12,107	944	3,167	.....
Arizona.....	29,803	1,055	.....	.....	474	4,582	\$179,022
Arkansas.....	56,862	.....	.....	.....	.....	.....	.....
California.....	421,327	45,375	436,421	30,281	17,199	47,190	4,895,538
Colorado.....	111,907	5,784	105,638	6,269	2,747	7,913	731,809
Connecticut.....	100,550	7,689	80,250	20,300	4,800	118,500	1,458,736
Delaware.....	16,600	.....	.....	.....	573	19,097	293,920
Dist. of Columbia.....	43,329	*11,000	.....	.....	.....	.....	.....
Florida.....	67,118	1,403	59,045	9,476	1,149	.....	532,336
Georgia.....	137,129	.....	.....	.....	904	.....	1,857,406
Idaho.....	46,360	.....	.....	.....	657	590	806,319
Illinois.....	497,318	.....	442,111	55,207	7,911	51,900	5,281,548
Indiana.....	302,308	.....	273,456	28,852	7,370	8,155	1,882,534
Iowa.....	405,182	.....	.....	.....	3,420	2,235	6,610,643
Kansas.....	253,896	5,550	247,756	11,690	4,262	.....	74,529
Kentucky.....	94,065	3,261	86,239	11,087	1,193	8,000	737,678
Louisiana.....	61,967	.....	.....	.....	.....	.....	.....
Maine.....	51,783	1,773	47,219	6,337	1,164	67,007	839,984
Maryland.....	75,700	5,500	73,050	8,150	4,000	23,000	*123,000
Massachusetts.....	233,258	18,546	206,094	45,710	11,883	90,000	2,305,048
Michigan.....	351,762	16,459	327,398	40,823	.....	.....	.....
Minnesota.....	295,898	7,103	.....	.....	787	7,618	99,805
Mississippi.....	57,000	.....	53,260	3,740	355	.....	114,710
Missouri.....	258,478	9,664	.....	.....	3,545	23,412	2,004,919
Montana.....	52,100	*1,400	.....	.....	550	1,200	373,000
Nebraska.....	212,130	500	194,630	18,000	1,100	.....	1,879,004
Nevada.....	9,383	.....	.....	.....	127	.....	.....
New Hampshire.....	30,415	.....	.....	.....	1,968	37,600	418,898
New Jersey.....	195,258	.....	174,354	20,904	9,665	243,427	2,908,353
New Mexico.....	20,300	.....	.....	.....	.....	.....	.....
New York.....	486,262	.....	387,593	98,669	15,164	109,279	6,297,686
North Carolina.....	123,000	.....	112,000	11,000	1,500	.....	1,391,982
North Dakota.....	76,953	4,592	.....	.....	728	.....	605,586
Ohio.....	567,000	*16,000	513,000	70,000	20,000	.....	.....
Oklahoma.....	181,200	.....	.....	.....	1,066	.....	2,043,035
Oregon.....	89,933	.....	.....	.....	.....	.....	.....
Pennsylvania.....	506,085	27,236	464,035	42,050	20,277	101,733	6,402,472
Rhode Island.....	*44,000	.....	.....	.....	.....	.....	.....
South Carolina.....	80,562	1,089	.....	.....	690	.....	486,050
South Dakota.....	114,408	.....	107,192	7,216	.....	.....	690,351
Tennessee.....	90,774	.....	80,405	10,369	.....	.....	.....
Texas.....	298,234	*70,000	.....	.....	3,556	16,701	3,081,846
Utah.....	37,261	.....	32,460	4,801	.....	.....	.....
Vermont.....	26,636	*800	.....	.....	.....	.....	.....
Virginia.....	105,000	8,000	100,000	13,000	2,000	4,900	1,500,000
Washington.....	143,561	6,414	127,934	22,041	3,909	.....	2,582,671
West Virginia.....	70,088	.....	61,330	8,758	.....	8,542	1,179,812
Wisconsin.....	280,452	.....	265,306	15,146	7,434	.....	3,116,220
Wyoming.....	21,250	.....	.....	.....	274	.....	240,000
TOTALS.....	7,904,271	276,193	5,118,495	631,983	165,345	1,005,748	\$66,848,551

*Estimated.

greatest actual increase during the last six months, but Pennsylvania, which followed close in the July to July increases, appears far down this list in fourteenth place. This indicates that Pennsylvania's greatest gain came during the latter part of last year, and that further increases may be expected before next January if last year's experience is repeated. Michigan, Wisconsin and Iowa have also showed large actual gains over the last reckoning. New York, Massachusetts and California, on the other hand, have not thus far registered nearly as many cars as they did during the entire year of 1919. It is possible to account for the deficit only by attributing it to local conditions. In California the active tourist season has not yet be-

gun, while the shortage of gasoline has probably had some effect upon the lack of registrations during the first half of the year. Nothing definite can be deduced from these figures, however, until the final returns for the entire year are in. Too much significance should not be attached to a decrease in mid-year totals.

The largest percentage of increase over Jan. 1 belongs in reality to West Virginia, although the District of Columbia heads the list. The coming and going of war workers last year at the capital caused some confusion in the registration office just about the time the year-end figures were being published. As a result, the low total at that time was not considered reliable, but was published

as being the nearest to the truth it was possible to obtain. An additional factor that makes Washington's figures higher at this time in any case is that the government fiscal year runs from July 1 to July 1; thus the current figures are certain to be larger than the year-end figures. Massachusetts has the greatest amount of lost ground to make up, having a deficit of 23.5 per cent. Eight other states, however, have a negative sign before their percentage marks, Maryland's loss being almost as large in per cent as that of Massachusetts.

In computing the number of persons per car in the various states, it has been necessary to use the Jan. 1, 1920, population figures, since no mid-year population estimates were

available. Iowa still stands in the lead in this respect with one car for every 5.49 persons, an advance over the former record set up by the same state at the end of last year. The rise of the District of Columbia from thirty-seventh to seventh place in the list may be attributed to the factors explained previously. Oklahoma took a definite step forward from 16.29 to 13.60, moving from thirtieth to twenty-sixth place in the standing. Although still last in the list, Mississippi has ten fewer persons per car

than at the last of 1919, having moved up to 35.55. Since Alabama's gain was not so great, Mississippi may pass her when the final 1920 figures are compiled.

More states are beginning to separate the passenger car and commercial car registrations, so that a better estimate can be made than before of the actual number of trucks in use. Twenty-seven states reported a segregated registration. While the number which do not segregate cars and trucks is still so great that an estimate made on the basis of the 27 must vary considerably from the actual total, the result should be nearer the truth than an estimate on the basis of 17 states, such as was necessary in dealing with the last set of figures. On the basis of 631,983 trucks registered in 27 states, the total number of commercial cars in the country may be estimated at about 975,387. On Jan. 1, 1920, *Commercial Vehicle*, after a careful survey, estimated a total of 674,300 trucks in service in this country. Thus a gain of 300,000 is already recorded over the final figures for 1919. There is every indication that this increase will be considerably augmented before Dec. 31, 1920.

The number of motorcycles registered is 165,345, a decrease of some 65,000 from the year-end total, and of about 8000 from the total of last July. The decrease cannot be recorded accurately because some states previously reporting motorcycle registrations failed to do so for the present tabulations, while others which did not report them before did report them this time. In almost every state, however, where accurate comparison is possible, a decided decrease is in evidence, and it is safe to say that there are fewer motorcycles in use at this time than there were a year ago.

With 12 states not reporting, the total fees collected for registrations of all kinds amounted to \$66,848,551, an increase of about two million over the high total of Jan. 1, and an increase of \$16,000,000 over that of last July.

An analysis of these figures will indicate that there will be a very large increase in total fees at the end of this year over last year's total. With the country back on a peace-time basis and the presidential election over, 1921 should be a great year for the good-roads movement. While costs of construction have increased, more money is available than ever before for road construction work and with motor vehicle fees steadily mounting, the problem of maintenance should become a less serious

one. These fees should be used only for upkeep.

The usual difficulty in obtaining accurate figures was experienced in collecting the data for these tabulations. Every possible effort has been made to render them accurate and to present them in such a way that they will represent truthfully the facts in every case. This is not always easy, because of the great difference in state registration laws, the difference in enforcement of the same laws, the difference in interpretation of the

Percentage of Increase in Registrations July 1, 1919, to July 1, 1920

West Virginia	55.67
North Carolina	54.75
Oklahoma	45.53
Mississippi	44.67
Oregon	44.20
Florida	38.10
South Carolina	36.54
New Jersey	34.88
Louisiana	34.28
Wisconsin	32.00
Alabama	31.58
Arkansas	31.53
Idaho	29.44
Michigan	28.66
Missouri	28.28
Virginia	28.04
Minnesota	27.58
Iowa	27.17
Colorado	26.71
Kentucky	24.98
Rhode Island	24.80
South Dakota	24.61
Pennsylvania	24.06
Illinois	23.90
Kansas	23.23
Indiana	22.89
Arizona	22.68
Ohio	21.76
Utah	21.13
New Mexico	20.60
Vermont	20.51
California	20.47
Texas	19.60
Georgia	18.77
Maine	18.60
Connecticut	18.02
Delaware	16.90
Wyoming	16.75
New Hampshire	15.95
Nebraska	15.92
Nevada	15.10
Washington	14.64
District of Columbia	14.24
New York	11.29
Massachusetts	11.04
Tennessee	8.06
North Dakota	5.40
Maryland .....	.14
Montana	-2.47

Average increase..... 24.32

Percentage of Increase in Registrations Jan. 1, 1920, to July 1, 1920

District of Columbia	123.47
West Virginia	39.60
Mississippi	26.56
Louisiana	23.96
Alabama	22.97
Oklahoma	19.77
Florida	19.31
Michigan	18.68
Wisconsin	18.35
Arkansas	14.98
South Carolina	14.85
Minnesota	13.93
Texas	13.25
Ohio	13.19
Tennessee	12.87
North Carolina	12.84
Missouri	12.58
Iowa	11.52
Vermont	11.31
Rhode Island	11.21
Kansas	11.06
Idaho	10.96
Virginia	10.52
South Dakota	9.35
Indiana	9.19
Georgia	8.34
Oregon	7.93
Colorado	7.22
Nebraska	6.08
Utah	6.03
Maine	4.82
Kentucky	4.51
Illinois	3.94
Pennsylvania	3.21
New Jersey	3.21
Arizona	2.85
Delaware	2.77
New Mexico	1.50
New Hampshire	1.36
Nevada .....	.84
Wyoming	— .57
Connecticut	— 5.02
North Dakota	— 7.15
Montana	—10.35
New York	—12.50
California	—17.12
Washington	—17.12
Maryland	—23.44
Massachusetts	—23.50

Average increase..... 9.26



Distribution of cars and trucks in the United States, all duplicates being deducted

same term in different states, and the utter inadequacy of the records of many states. It is outside the scope of the present article to present in detail the specific faults of the various state registration laws, but it becomes more evident each year that the compilation of accurate figures, capable of rendering the best service to the automotive industry, will necessitate, sooner or later, a comprehensive, intelligent registration law.

These figures, when analyzed, may possibly shed some light on the much discussed "saturation" problem. This particular discussion has been a live one within the industry, but especially among students of economics, since about 1911. Only recently a New York financial paper gave considerable space to it.

There is one feature of this discussion that always is overlooked. And that is that all "per population" figures are based on the percentage of motor vehicles to population; not on the number of passenger cars or the number of trucks. In computing saturation, these two can never be taken together without confusing the issue. In Iowa, for instance, where the per population figure is reduced to one vehicle to each 5.49 persons, there is no registration of trucks as separate from passenger vehicles. In Iowa there are 217,044 farms, of which 187,642 are 50 acres or more in extent, according to the last Federal

figures on numbers and size of farms. Just how large an ownership of trucks this number of farms would indicate, when the saturation point in commercial vehicles is reached, we are unable to say. The present registration of motor vehicles is 405,182. The number of farms in the state would appear to indicate the possibility of ownership of almost half that many trucks, on farms alone. There is, of course, an entirely separate demand for trucks in Iowa, the industrial demand, which must be figured by other methods.

The method of figuring saturation by a mere comparison with the population may be a short-cut to proof of a theory, but its results cannot be looked upon as accurate industrial figures until such a time as the average is proven. Who will even consider for a moment that the requirements of the people of New York City will be comparable with the requirements of Iowa, where distances are long and subways have not yet imposed themselves, and are not likely to. It must be remembered that all population figures are due for a change as soon as the census department announces the results of the January count of the population. The figures in these tables and comparisons are the same as used Jan. 1.

Truck figures are as yet more or less elusive. Recently the Federal government gave out some truck fig-

ures of farm ownership in the several states, but instantly these were shown to be inaccurate. Not until the vehicles are separated in some such state as Iowa will there be an approximate figure on saturation.

In 1913 there was some lively discussion of saturation, and we find that in that year there was, in Iowa, one motor vehicle for each 47 persons. At that time Iowa was running strong in the percentage increase, indicating that the sales curve was still going strongly upward. This condition as to sales was still indicated by the figures of 1917, when the number of persons per car was 13. At that time the truck had not yet invaded the rural districts in great numbers.

In 1920 Iowa has shown an increase in number of vehicles in a year of 85,682 and a percentage of 27.17, which indicates that the state is still a rare sales field. Counting the replacements at one in six of the vehicles in use a year ago, there must have been a sale of almost 140,000 vehicles in that state within a year. Even if this figure is shaded because the ratio of loss of vehicles in rural states is not as heavy as stated, and because trucks last longer on the average than passenger cars, there is still a very heavy sale there, which robs the saturation point talk of its terrors for the manufacturer.

There is another point of interest in this mid-year's figures. It comes

in the percentage of increase table. This is a comparison of the table showing that the number of vehicles increased over a year ago in Ohio, which leads the list in numbers, drops to 29 in percentage of increase, while Iowa which is fourth in numbers, drops to 18 in percentage. In the percentage of increase table, based on comparison with the registration of a year ago, the leaders are West Virginia, North Carolina, Oklahoma and Mississippi. A few years ago these states were not considered factors.

Number of Persons Per Car July 1, 1920

Iowa	5.49
Nebraska	6.17
South Dakota	6.62
Kansas	7.48
California	7.56
Minnesota	8.04
District of Columbia	8.76
Michigan	9.03
Wisconsin	9.20
Wyoming	9.21
Colorado	9.29
Ohio	9.40
Indiana	9.55
Montana	9.56
Oregon	10.18
Idaho	10.32
North Dakota	10.63
Arizona	10.64
Washington	12.00
Utah	12.44
Nevada	12.65
Illinois	12.86
Connecticut	12.99
Delaware	13.16
Missouri	13.41
Oklahoma	13.60
Vermont	13.79
Florida	14.33
New Hampshire	14.74
Rhode Island	14.76
Maine	15.20
Texas	15.71
New Jersey	16.11
Massachusetts	16.66
Pennsylvania	17.64
Maryland	18.43
North Carolina	20.60
South Carolina	20.84
West Virginia	20.92
Virginia	21.47
Georgia	21.70
New York	22.28
New Mexico	22.34
Tennessee	25.61
Kentucky	25.78
Louisiana	30.87
Arkansas	31.95
Alabama	33.48
Mississippi	35.55

These comparisons indicate that the sales curve is changing. In the states in which the number of vehicles registered is now large, the curve was sharply upward—several years ago.

In the southern and in some western states there was not much rise. In the former states, while sales are still large, the curve is flattening somewhat, but in the states that were slow to take up the automobile there is a sharp upward slant in sales during the last period.

Sectional figures are always of interest. There is perhaps no better sectional grouping of states than that used by the Federal government. In the main, the states so grouped are of a kind and have a community of industrial interest. The chief disturbing factor as far as automobile ownership in these states is concerned is the large cities. Grouping the states in this way, we find percentage of increase since a year ago is as follows:

West South Central.....	32.73
South Atlantic.....	29.24
East South Central.....	27.32
Pacific	26.44
East North Central.....	25.84
Middle Atlantic.....	23.48
West North Central.....	21.93
Mountain	18.75
New England.....	18.16

Thus it will be seen that the group showing the greatest percentage increase is the West South Central group—Arkansas, Louisiana, Oklahoma and Texas. Next in order is the South Atlantic group—Delaware, Maryland, District of Columbia, Virginia, West Virginia, North and South Carolina, Georgia and Florida.

The third group is the East South Central—Kentucky, Tennessee, Oklahoma and Texas.

A surprise is found in the Pacific group ranking next, as it was supposed that gasoline and other troubles had cut sales in Washington, Oregon and California.

The East North Central group is next, with Ohio, Indiana, Illinois, Michigan and Wisconsin.

The Middle Atlantic States are New York, New Jersey and Pennsylvania.

The West North Central has been considered the most fertile sales field and probably is, because of the heavy ownership of cars there. These states rank low in percentage of gain, but high in ownership. They are Minnesota, Iowa, Missouri, North Dakota, South Dakota, Nebraska and Kansas.

The Mountain States can never be heavy ownership states. They are Montana, Idaho, Wyoming, Colorado, New Mexico, Arizona, Utah, Nevada.

Finally comes New England, where use of cars is limited and where early ownership was comparatively heavy.

These states are Maine, New Hampshire, Vermont, Massachusetts, Rhode Island, Connecticut.

It may be emphasized again, however, that if the automotive industry wishes more detailed and more accurate registration figures, it will be necessary for the entire industry to put all of its political influence behind the adoption of better registration laws in the various states. To-day, the requirements in the commonwealths are too varied to permit the compilation of better figures.

Increase in Registration Over January 1, 1920

Ohio	66,076
Michigan	55,384
Wisconsin	43,478
Iowa	42,182
Minnesota	36,155
Texas	34,892
Oklahoma	29,900
Missouri	28,901
Kansas	25,295
Indiana	25,053
District of Columbia.....	24,869
West Virginia	19,885
Illinois	18,880
Pennsylvania	15,748
North Carolina	14,000
Alabama	12,528
Nebraska	13,030
Mississippi	11,970
Louisiana	11,967
Florida	10,865
Georgia	10,566
South Carolina	10,419
Tennessee	10,352
Virginia	10,000
South Dakota	9,783
Colorado	7,541
Arkansas	7,414
Oregon	6,601
New Jersey	6,091
Idaho	4,580
Rhode Island	4,437
Kentucky	4,057
Vermont	2,707
Maine	2,382
Utah	2,117
Arizona	824
Delaware	448
New Hampshire	407
New Mexico	300
Nevada	78
Wyoming	— 121
Connecticut	— 5,050
North Dakota	— 5,933
Montana	— 6,017
Maryland	— 23,295
Washington	— 24,585
Massachusetts	— 54,801
New York	— 69,527
California	— 72,136

Total increase..... 380,697

Fitting the Highways to Modern Transportation Needs

Many of our national highways are known as "trails." Too often the name fits them very well. In the following article, Mr. Jennings points out that the day of "trails" is past. Roads must be so constructed as to bear heavy truck traffic and must connect large centers by straight line routes.

SOME years ago an automotive testing expert, of several years' experience in driving cars in the Eastern States, went West. After he had crossed the prairies of Illinois he could talk of little else than the long stretches of straight highways. He was a well educated man and he often had read of the prairie highways, but he was entirely unable to comprehend the meaning of a straight highway from a utility point of view until he had driven over them.

He was enthusiastic over the experience of being able to sit in his machine and practically ignore the driving for miles while giving his attention to the sounds and other test indications from his chassis. This particular man had never before conceived the meaning of a straight-line highway. Even after his experiences with the prairie roads he had only a slight conception of what straight, adequate highways would mean to business. He was not entirely to be blamed for this, for at that time the motor vehicle had not been added to the trinity of transportation and the truck had not then either "won the war" or "saved business when the railroads were overloaded."

To-day, wherever highways are discussed by men who are most interested, it is conceded that the era of transportation highways is only beginning. It is admitted that the expenditures of recent years are to be dwarfed by those of the years to come; that as large as sums now talked of in annual statements loom, they are but small contributions. The big question, according to highway engineers and financiers, is not "How much shall we spend?" but "How shall we spend it?"

It is admitted that present specifications for highways are not sufficient. H. G. Shirley recently told the members of the Society of Automotive Engineers that the best highway knowledge of the country was unable to determine the proper sort of highway. The contour, the composition of the surface, the width and several other general problems had been well solved, but to support the new industrial giant—the motor truck—some better foundation was required. Just what this would be he could not say. He thought that the solution of the subsoil treatment in clays must be transferred to the chemical engineer. Other sub-strata required solutions from other sources. But his main point was that we have not yet solved the problem of building the ideal highway.

While these problems are being solved, there is another point that might well be considered. Most highways, especially in rough country, are trails that have developed into roads. Originally, and to this day it is the same, they followed only the line of least resistance, or the vagaries of the cows that we called home from a distant field by the evening bell or horn at the isolated farm house.

In recent years the A. A. A. and other agencies have done much good work in the way of elimination of dan-

gerous curves, but there has been no effective and consistent effort made toward straightening the highways of the nation with a view of speeding transportation. The railroads have done much of this in recent years. When the railroads were laid out, fuel was cheap and difficulties of construction loomed large. As a result, the surveyors followed the line of least resistance, usually following the vagaries of streams and keeping out of the way of only the average flood. When railroad transportation came to be recognized as an economic science and one of the chief instruments in the business of the nation, the construction engineers were set to work to revise the lines with a view of obtaining the greatest practical speed at the least cost of fuel and wear to rolling stock. Everybody is familiar with the ruthlessness of this work. Towns that had been on railroads since their beginning were left far isolated, long sections of tracks were torn up and shorter and safer tracks were laid. It had been learned that a fractional per cent saving on the ton-mile cost would soon pay for these apparently extravagant expenses.

In cities the same tendency has developed. Every large city within the last few years has found it necessary to be quite ruthless in widening certain thoroughfares, regardless of the cost of property. The widening of Fifth Avenue in New York was a type of this emergency work.

The lesson of these incidents had better be drawn now than later. Engineers should give their first attention to the layout of the road before going ahead with the permanent improvements. Where the road can be made into a straight line between two important transportation centers, no expense should now be spared to construct it in this manner. Whatever this expense may be, it will be less now than in the years to come.

Few of the large transportation centers have reasonably direct highways to the nearest transportation points. New York has scenic highway routes to Boston and Philadelphia, but no commercial highway. The promoters of the various national highways have done an excellent work in a way, but in the main they have looked at the roads with one eye for the scenery hunting and the other for the already established roads. Most of these highways are called "trails," which name seems to fit them very well. But motor transportation has passed the days of "trails" and now needs efficient and economical highways, the routing of which will recall the incident told of the Russian Czar who threw out of the window the surveys for a railroad from Petrograd to Moscow, put a ruler on the map and drew a straight line.

The idea expressed here is one that will require much support if it is to be accomplished. The automotive industry has more at stake in this idea than any other industry, because it is interested both from a transportation and selling viewpoint.

Buick Changes Make for Durability and Quietness

Established practice is little altered by improvements, which appear to be based upon reports of service departments to provide greater wear and increased accessibility and convenience for the owner and service station. Several bearings, including the front main bearings, are made larger.

By J. Edward Schipper

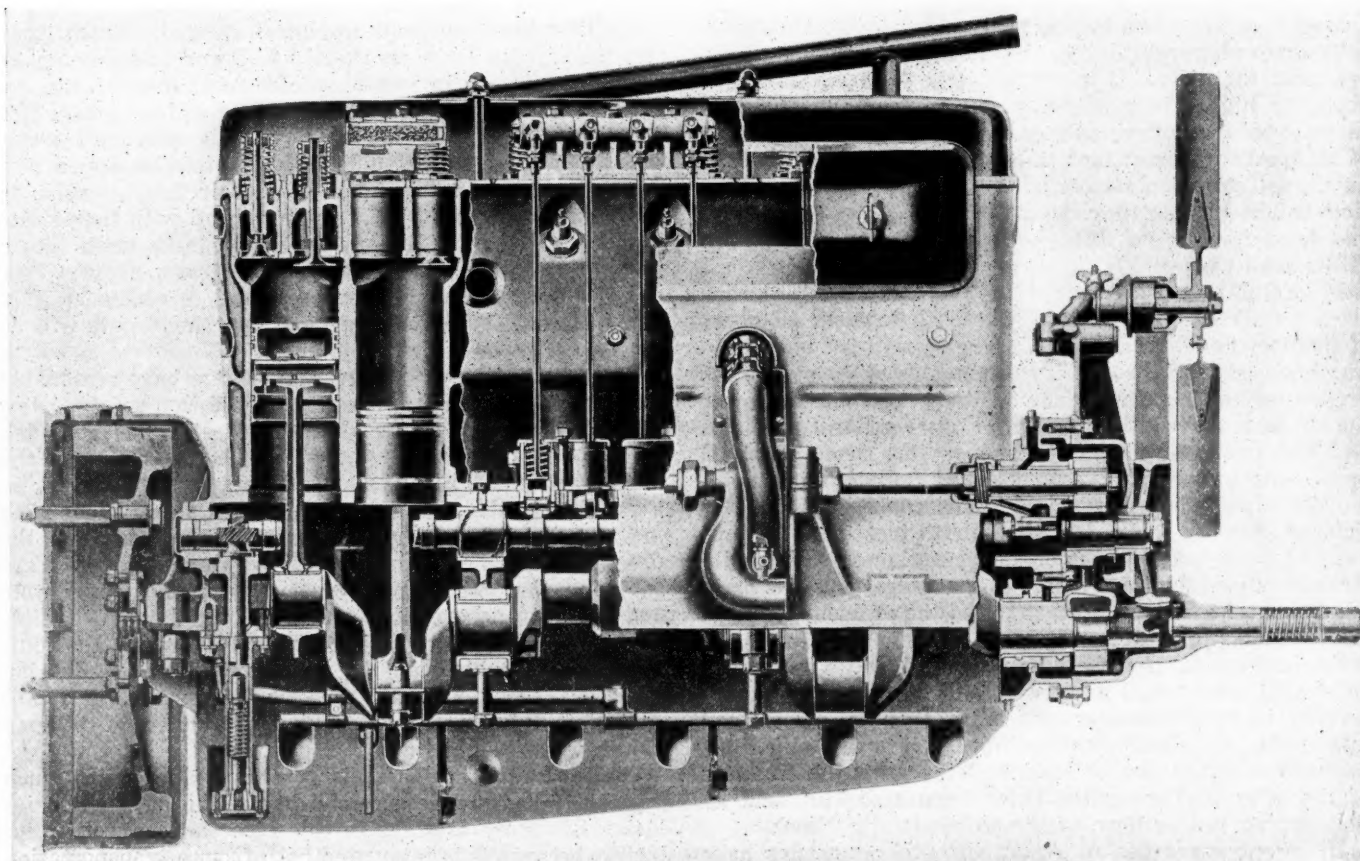
COMpletely redesigned bodies characterize the new Buick line, of which samples have just been delivered to distributors throughout the country. The new cars are larger in appearance, owing to the elimination of the cowl lines and the adoption of the straight line design now in vogue. The line comprises seven models, viz., a three-passenger roadster, five-passenger touring car, four-passenger coupe and five-passenger sedan, all on a 118-in. wheelbase chassis, and a four-passenger coupe, seven-passenger sedan and seven-passenger touring car on a 124-in. wheelbase chassis.

Most of the changes in the engine and its appurtenances have been made with the object of rendering the parts affected more durable and more quiet in operation. The piston pin has been enlarged from $\frac{3}{4}$ in. to $\frac{31}{32}$ in. diameter, and a more positive method of anchoring it in the piston has been adopted. This consists in the use

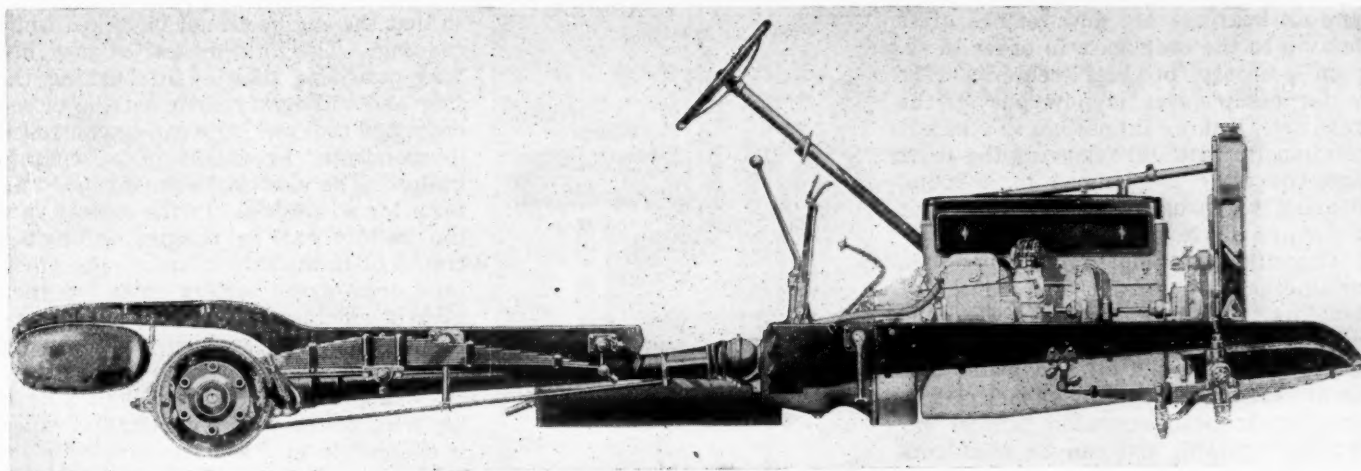
of a screw fastening in place of the former cotter pins. Both the front main and front camshaft bearings have been enlarged. The front main bearing now measures $2\frac{3}{4}$ in. in length, instead of $2\frac{1}{8}$ in., and its cap is held on by two additional studs. In the case of the enlarged front camshaft bearing, the bushing is now pressed into the crankcase in the same way as the bushings of the two center bearings, thus insuring a more accurate centering of the camshaft gear.

For the camshaft gear Fabroil (compressed cotton) has been adopted, and the width of the face has been increased from 1 in. to $1\frac{1}{4}$ in. Motor oil is now automatically circulated through the timing gear housing. The oil is fed into the gearcase from a splash pocket at the front end of the crankcase and overflows from the gear case through a drain hole back into the crankcase.

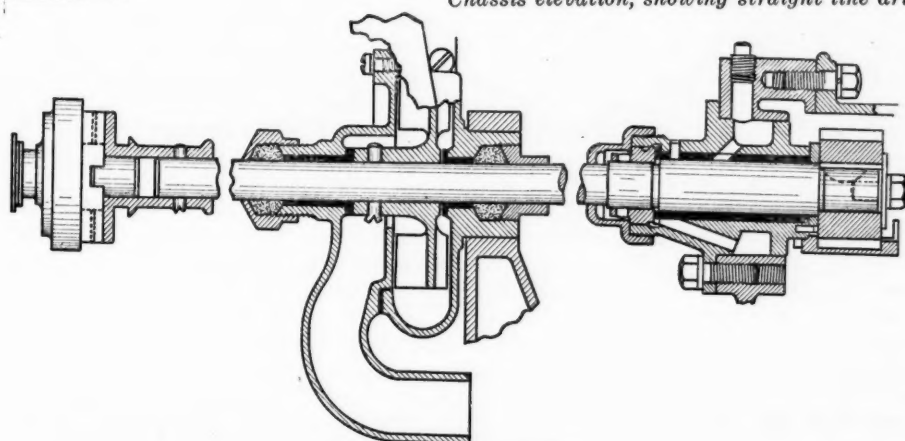
A stiffer support is used for the pump shaft bearing,



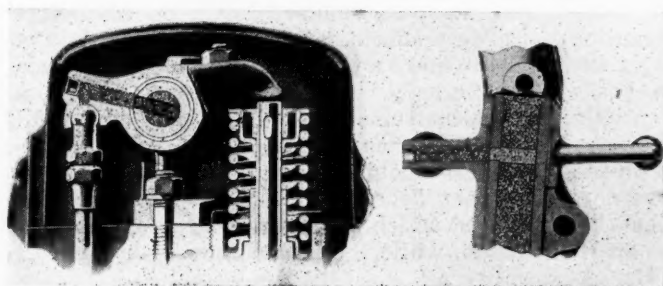
Port section through Buick six-cylinder overhead valve engine



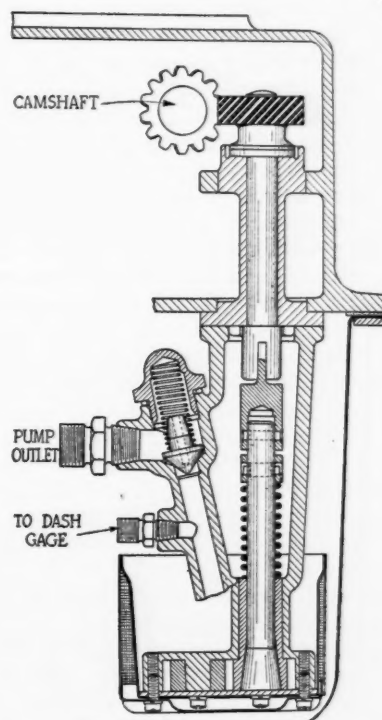
Chassis elevation, showing straight line drive



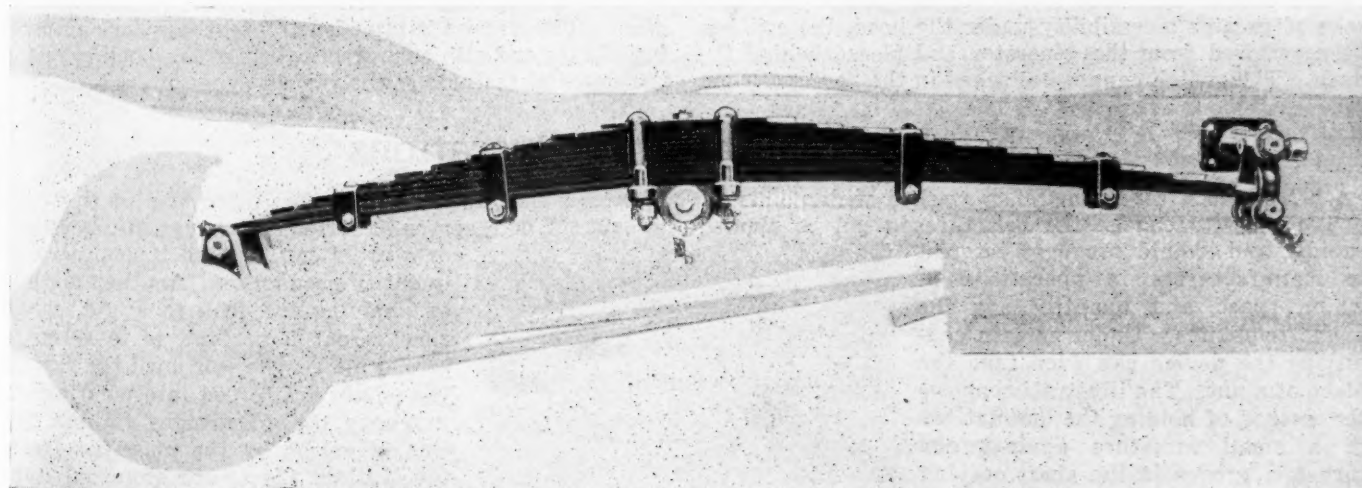
Water pump and drive



Method of lubricating valve rocker arms



Oil pump mounting and drive



Arrangement of cantilever type rear spring

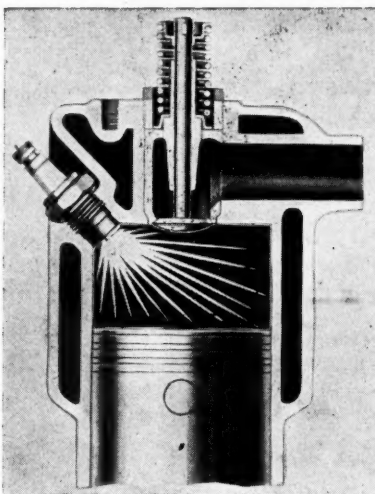
and all bearings are now reamed after bolting to the crankcase in order to secure accuracy of gear centers. The water pump cover is now put on the rear side, making it possible to take out the impeller without removing the shaft and the body is clamped in a round bearing to insure a better line-up at the pump shaft.

Miscellaneous improvements include an increase in size of the generator coupling, a higher fan to correspond with the higher radiator, accessible drain cocks for the oil and water and an increase in the cooling capacity. The drain cocks have extension handles extending upward, and can be most conveniently reached. The new radiator has about five per cent more exposed core area, and the core depth has also been increased from $2\frac{1}{2}$ to 3 in. in width, whereby an increase in cooling capacity of 8 per cent has been obtained.

In the new model the clutch adjustment can be made by simply lifting the floor board and applying an ordinary wrench to a hexagon extension nut. A better grade of spring steel is being used on all models, and on the seven-passenger open and sedan models the springs have been lowered $\frac{1}{4}$ in. and made more flexible. Snubbers have been added as regular equipment to the front springs on the four-passenger coupe and the five-passenger sedan, which latter has an entirely new set of springs. The shackle bolts at the rear of all front springs have been increased in diameter from $\frac{9}{16}$ to $\frac{7}{8}$ in., and the brackets at this point are more rigidly fastened to the frame.

An improvement has also been made in the design of the muffler, the method of supporting the inner shells having been changed so as to allow relative expansion and contraction, which are taken up in the bends of the supporting brackets for the inner shells. The heads are welded to the outer shell and the muffler is entirely without gaskets and claimed to be explosion proof.

All closed models have a gasoline gage mounted on the dash, and a better grade of tools and tire pump are now furnished with the car. The electrical equipment includes the new Delco distributor unit in which the spark advance is secured by moving the cam instead of the entire distributor head. The generator drive coupling has been increased in size, and the condenser is now mounted on the breaker box close to the contact points. For the sake of greater accessibility under the hood, the coil has been removed from the generator and placed behind the dash. The switch cannot be locked in the "on" position,



*Showing spark plug location
in Buick engine*

so that the engine cannot be locked while running. The lighting switch now has four positions, allowing of burning the side and tail lights along on the closed body, and the cowl lamp can be controlled independently by means of a separate button. The electrical equipment is uniform for all models. In the closed types the battery can be reached through a trap door in the floor boards. The burnt joint area of the battery posts has been greatly increased. For the battery ground connection, which was formerly made by a strap bolted to the battery-box support, use is now made of a flexible wire bolted to the car frame, which is claimed to give a better and more reliable connection.

On the new models, the steel fellow wheel is used, chiefly on account of the scarcity of good fellow wood. The rim, wedge bolt and driver on these wheels are the same as on the previous models.

The hand brake sector has been redesigned to facilitate the release of the brake. On the five-passenger sedan a rear axle ratio of $4\frac{3}{8}$ is used, whereas the standard ratio is 4.

The most apparent changes in the new Buick line have been made in the bodies, and they cover not only features of appearance but also the general character of construction, making the bodies more rattle-proof. For instance, a bead is now stamped on the running-board apron, stiffening that part, thus eliminating the drum-like noise sometimes caused by it. All the open bodies are of entirely new design. The cowl height has been increased $2\frac{3}{16}$ in., and the width $\frac{3}{4}$ in. The general contour of the shroud has been worked out to harmonize with the new radiator and the hood. The windshield brackets are assembled inside the cowl, thus eliminating outside brackets. An angle weather strip is fitted to the cowl to make a tight joint between the windshield rubber and the body.

The instrument board has been advanced 1 in. to give more clearance for the control levers. The sides of the body are about an inch lower and a new style door lock has been developed, so that an outside door handle can be used which opens the door when turned in either direction, while the inside door lever is also retained.

LIEUTENANT COMMANDER LIND, formerly a teacher at the United States Naval Academy, has written a practical treatise on Internal-Combustion Engines. The treatise is intended as a textbook for engineering classes and also as a practical reference book covering the essential features of the various types of engines.

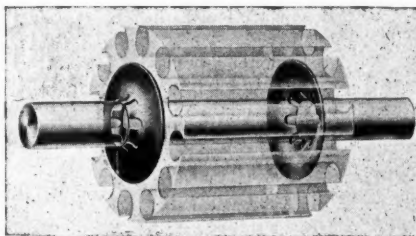
Nut Lock for Quantity Operations

A NUT lock consisting of a washer with points or prongs to engage the bolt threads can be applied rapidly and should prove of interest to manufacturers in operations in which speed and quantity are the prime requisites. Under certain conditions the device can even take the place of a nut. The illustration shows the method of holding the laminations of a small armature against end thrust, a groove in the shaft serving as an anchorage.

In applying the lock to a nut, a ham-

mer blow on a hollow set, or on a piece of pipe that will fit over the bolt, serves to flatten the prongs into position, or a press can be used if desirable in quantity production. Another method of applying the lock to a nut, when time is not important, is to screw a second nut on the bolt until the fastening points are forced into position.

Among the advantages claimed for this invention by the manufacturers, the Nutlock Corp., are economy, light weight, annealed steel construction, and quick adjustment.



*Nut lock applied to armature
laminations*

Cause and Cure of Front Wheel Wabbling

After noting the vagaries of front wheel action at slow speed on rough roads, Mr. Clayden made some rather unconventional experiments and has reached some interesting and instructive conclusions as to improvements of the steering gear to meet the conditions that cause the trouble.

By A. Ludlow Clayden

IMPERFECTIONS in the conventional type of automobile steering gear have formed the subject matter for many articles, but there is one trouble peculiar to it which the writer has never seen discussed, this being the tendency for the front wheels to wobble violently when running *slowly* over rough paved roads.

It is well known to anyone who is in the habit of handling many different cars that some suffer acutely from this trouble and others hardly at all; while it is also a fact that the worst steering gears from the wobble viewpoint are often excellent in other ways.

Having occasion to investigate a particularly vicious example of wabbling, the writer found that it had a direct connection with certain steering gear proportions, and the following is an endeavor partially to explain the causes. The forces involved are complicated and it appears almost impossible to analyze them quantitatively with any degree of accuracy. However, the correctness of the theoretical study following, at least so far as its general terms are concerned, appears to be proved by experiment.

Definition of Wobble

Wabbling usually occurs at its worst when driving at less than 10 m.p.h. over badly worn asphalt or macadam. It consists of a flapping or oscillation of both front wheels of a rapid and sometimes violent character. The actual deflection of the wheels from the straight is usually only a few degrees. Sometimes the wobble can be felt on the steering wheel and sometimes not. Increase in speed usually damps it out, but by choosing the worst speed it is sometimes possible to create such a vibration in the wheels as to cause the whole front of the machine to shudder in a rapid pendulum-like action transverse to the direction of travel.

Castoring an Evil

The writer on examining the subject first observed that wabbling almost always occurred in cars which had castor action to a perceptible degree and was commonly absent from cars in which the steering had no particular sense of direction.

Secondly, it was noticed that cars with a free and easy handling steering were often bad offenders, while others with a stiffer action were innocent of wobble.

Thirdly, it was proved that a car with good castor ac-

tion but bad wobble could be rendered much better by tightening up all connections to the point where perceptible friction was introduced.

Fourthly, it was also proved experimentally that leaving the steering free and removing all castor action by changing the king pin position was equally effective in removing wobble.

These experiments made it appear that wobble is *caused* by certain king pin settings which give castor action; that the introduction of friction can dampen wobble down to the point where it becomes completely dead beat. And it was thence deduced that castor action as conventionally obtained could not be combined with very free acting steering without wobble. It should be added that cars of several different makes were used in the experiments leading to this conclusion.

When friction was introduced it also appeared that its effect was best when it was closest to the king pin. For instance, in one case, tightening up the ball joints of the drag link reduced a bad wobble, but substituting a plain king pin thrust bearing for an antifriction type completely *cured* it.

Momentum Not a Factor

In trying to work out the forces which cause wobble, the first cause seems to be that one front wheel, by striking a lump or falling in a hole, is slightly deflected and it is thus the reaction from this deflection which makes the wobble.

Now it is invariably found that wobble vanishes as speed increases and it, therefore, seems reasonable to assume that the kinetic energy of the car due to its forward travel is not the motive force which builds up wobble and an explanation was therefore sought which eliminated momentum in a horizontal direction as a factor of first importance.

It should, however, be added that the tendency of the wheel to resist deflection from its plane of rotation increases rapidly with the speed of rotation while the time element of a bump decreases correspondingly. This aspect of the case will be returned to later, as it is productive of a secondary effect of some interest.

King Pin Reactions

The analysis of relative movements of different parts of the front axle system is not easy to follow by diagrams

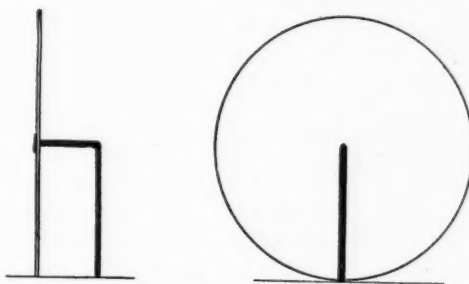


Fig. 1

alone. To anyone deeply interested in the subject the writer recommends the construction of a model such as that sketched in Fig. 1.

This consists of a piece of wire, a disk of cork or soft wood to represent the wheel and a base piece of cork. In the sketch Fig. 1 the portion of A of the wire represents the king pin and the arrow represents the center line of the chassis, showing the direction of motion.

It is obvious that the wire can be inserted into the base at any angle, and so represent any king pin setting relative to the ground. By bending the wire the angle between the king pin and the axle spindle can be varied.

It will be shown that the effect of several kinds of king pin arrangement is to raise or lower the whole mass of the car, which is supported by the axle, as the wheel moves out of its straight path. It is, however, more convenient to think of the car as fixed and of the wheel moving up or down as it is steered. In using the model, the top of the table on which it stands is, of course, fixed and one can see that the wheel approaches or departs from the surface as it is steered. In actual practice, with the wheel resting on the road, the action would be reversed and the front axle would be lifted or lowered. This should be remembered in reading the analysis.

Conventional Simplest Form

Fig. 1 shows the simplest expression of the conventional steering arrangement. The king pin is vertical in all planes and the wheel spindle is horizontal in all planes. It does not require the model to show that in this case the wheel is neither raised nor lowered by the action of steering. In other words, steering to right or left does not tend to lift or to lower load on front axle.

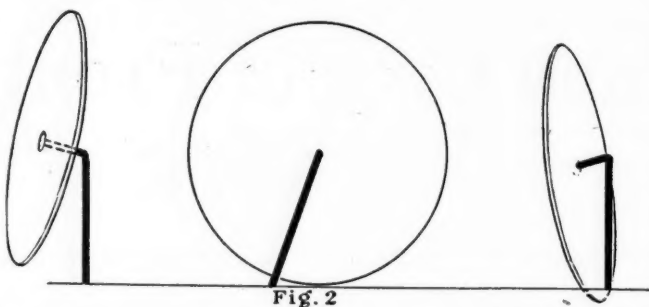
It is found by experiment that this form of steering does not seem to be capable of permitting wobble, but it also has no castor effect.

It should, however, be observed that the tendency of a road shock to deflect the wheel from the straight path is at a maximum in this arrangement because there is no inherent feature to counteract road shock effects.

It also follows that the greater the distance from king pin center to wheel center, the greater the leverage of a road shock. Hence, if the king pin could be placed in the plane of the wheel so that the center lines of king pin and wheel coincided, then normal road shocks would have no deflecting tendency whatever. This construction will be mentioned again later on.

Now take the same layout as Fig. 1 and rake the king pin so that its center line produced cuts the road ahead of the contact of the wheel with the road. This is equivalent to placing a taper wedge with the thick end to the rear, between the spring and the spring table.

Setting the model up in this way, with the wheel straight and in contact with the table, let us then imitate a turn to the right. It will be seen that this lifts the wheel off the table. Try to turn the other way and the wheel binds, or else lifts the whole model; proving that the left-hand end of the front axle is *lowered* by making a turn to the right and *raised*—by making a turn to the left. An action which for good steering is precisely the opposite of what is required. Fig. 2 shows the



so to a slight extent lifts the left side of the car and lowers the right side. As soon as the two wheels are thus turned out of the straight, the front end of the car is therefore put in unstable equilibrium and tends to again assume its level position. In other words, the displaced mass of the car tends to cause the wheels to return to the straight position. This partly accounts for the castor action.

Neglecting other forces and assuming the friction small enough to allow the car to return to stable conditions, it follows that a pendulum action will permit the wheel to swing past the straight position as though commencing a right-hand turn. This will again reverse, and the front of the car will oscillate with the swing of the wheels till such friction as is present will gradually absorb the energy.

There is another action due to the movement of the car as a whole. Remembering that with the wheel plane outside the king pin the front wheels are always trying to spread, it follows that the force trying to push the wheels apart in front is proportional to the rolling friction and to the distance from wheel center to king pin center, the leverage, that is.

Now, to get proper rolling on curves, the angle of cut of the *inside* wheel is always greater than that of the outside wheel. As the wheels are turned for steering, the center line of the wheel moves inward toward the center of the car, thus reducing the leverage just mentioned; but owing to the difference in angle of cut the leverage on the outside wheel is always greater than that on the inside one. Furthermore, owing to centrifugal force, there is a greater weight thrown on outer wheel.

In the arrangement of king pin of Fig. 2 we therefore see that when the wheel is moved from the straight path, both the weight of the car and the momentum thereof are tending to cause return to normal or straight position of the wheels. The effect of the weight is constant; that of the motion is in proportion to the speed. It is probably the latter effect which explains why a car with this steering arrangement and pronounced castor action is often very hard to steer around curves at high speed. The lowering of the outside and raising of the inside ends of the front axle probably also is a factor of some moment when speeds are high, although the actual movement is very small.

If the direction of inclination of the king pin be changed so that it is raked forward instead of backward the forces involved remain essentially the same, but with the difference that it is the *outer* side that is lifted on a curve. This can readily be seen from Fig. 2 and from the model by thinking of the direction of travel as being reversed.

Transverse Tilting

A very common form of front axle has the king pin raked transverse to the car so that the king pin center lines produced would meet at some point above the front end of the machine. This form



probably originated from a fallacious idea which was: that if the center line of the king pin produced should strike the road at the same point as that of tire contact, then there would be no deflecting tendency due to road shocks. Fig. 3 shows the fallacy. To cause a shock whatever it is that the wheel strikes against must be an *obstruction*. That is to say, it must be something *above* the point of contact of the tire, something which will transmit a shock not vertically, nor horizontally but radially inward from tire to hub along a line making some angle with the vertical.

Now such a force must travel through the wheel and be applied to the geometrical center of the hub. Here its horizontal component tends to deflect the steering because it has a moment about the king pin axis.

The momentum of the car acts through the front axle, to the king pins and from the king pins through the wheel spindle to the hub of the wheel. Thus there is always a "leverage" between the king pin and the center of the wheel equal to the normal distance between them. Referring to Fig. 3, which shows an exaggerated example of this form of king pin setting, it is obvious that the leverage of the wheel center over the king pin center is equal to $AB \cos \theta$, or that the deflecting effect of road shocks is only reduced in proportion to the cosine of the angle between the king pin and the wheel spindle.

There is, however, an interesting secondary effect due to tilting the king pin axes in this way. In Fig. 4a is shown a view of a left-hand front wheel in the straight position as it would be seen from the rear, while Fig. 4b shows the wheel as it would appear as seen from the side and with the wheel cut at an angle of 90 deg. In both a and b views the horizontal center line of the axle is the same, and it is seen that as the wheel is turned about the king pin for steering it is lowered as a whole.

Of course this means that in practice, as the wheel is steered for either right or left-hand turns, the front axle is lifted further from the ground. In other words, if the king pin axis be inclined as viewed from in front or behind, and vertical as seen from the side, then the equilibrium is only stable when the front wheels are in the straight position, since any deviation to either side lifts the whole front end of the car.

This of itself would give a castoring action and would be subject to the pendulum action that causes wobble, but it should be noted that rapid oscillation of the front wheels would merely cause vertical vibration of the front end, equal as to amplitude on both sides; in contradistinction to the rocking effect which is produced by a king pin raked fore and aft.

Now it is usual to find both systems combined. That is to say, when the king pins are inclined transversely as just described, they are most generally raked fore and aft as well. This gives a combination of effects. For example, suppose the king pin is inclined transversely a certain amount and vertical in side elevation it might be found that a cut of 20 deg. would lift the axle a quarter of an inch.

Still considering the left-hand wheel, it will be remembered that the effect of raking the king pin fore and aft is to cause the car to drop when turning to the right and to lift when turning to the left. Thus it follows that we can choose an angle of rake which would cause the car

to drop a quarter of an inch with a 20 deg. right-hand cut. If this were done then the combined effects of the two inclinations of the pin would be to cause the car to lift half an inch on the left side when turning to the left, the right side meanwhile remaining undisturbed so far as vertical movement is concerned. And, of course, *vice versa* for a turn to the right. These actions can readily be shown by adjusting the model and the writer most strongly urges anyone really interested in this subject to construct a model because the subject is made so much clearer thereby.

Wobble Elimination

It has already been said that wobble can be eliminated by the introduction of sufficient friction to damp out the vibration, or by choosing a construction which gives no castoring action whatever, but neither of these things is desirable. A theoretically better way is found by entirely revamping the design of the front axle.

It is possible, though difficult, to place the king pin actually in the center plane of the wheel. This was done some sixteen years or more ago by P. L. Renouf, who produced a car having for that time a really wonderful steering. However, the mechanical difficulties were great with the conventional wood wheel, and greater still with the wire wheel, so the system never gained any supporters. There is an indication, however, that the coming into vogue of the disk wheel is encouraging some engineers to experiment with the Renouf system, as instance one of the latest British cars, the Armstrong-Siddeley.

To study the action, first of all suppose that the king pin is truly vertical in all planes, and that it lies in the plane of the front wheel.

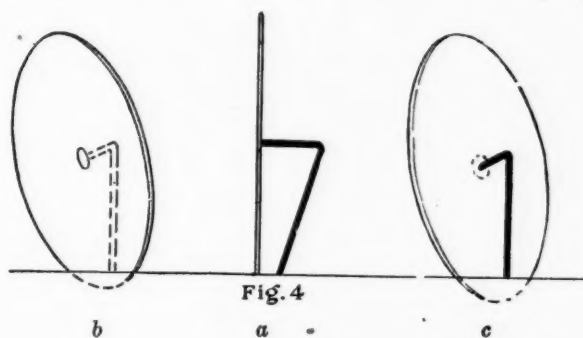
Then it needs no model to show that however the wheel be turned it has no lifting or lowering effect, and likewise the rolling resistance of the wheel has no moment over the king pin and therefore there is no tendency for the wheels to spread, as must always be the case with the conventional axle. Thus the wheels will both be stable in all positions. There will be no castoring action though, and what is gained in actual practice is a steering very light in action and almost immune from disturbance from ordinary road shocks.

If we want castor action it can be obtained by raking the king pin fore and aft, still leaving it in the plane of the wheel, but if this is done we have the lifting and lowering effect just as it obtains in the conventional form of axle shown in Fig. 1. A method which appears to be superior in every way is to make the wheel *trail* so that while retaining all the virtues of the Renouf system it still tends to keep straight as long as the car is moving.

This can be done by putting the king pin in front of the center of the wheel, which is not impossible, although it admittedly makes the design more difficult than ever. Fig. 5 shows such a construction in diagram. It is obvious that this design would give a true castor action, but experiment alone will decide how far ahead of the wheel center the king pin axis would have to be.

Drag Link Wobble

There is, of course, another cause of wobble which is well understood and usually provided against, more or



less. The front axle moves relative to the front spring eye on a curve which is nearly a radius from the spring bolt center. Naturally the front end of the drag link, being attached to a ball on the front axle, must move similarly.

The other end of the drag link is constrained to move on a true arc having for its center the ball at the rear end of the link. Since it is impossible to make the two opposing arcs coincide and, since the rear ball joint on the link may be regarded as fixed, it follows that compression or expansion of the front spring will cause the ball joint at the front end to move slightly. If the proportions are very bad indeed, this alone can cause perceptible wobble, but as already stated, the effect is quite negligible in any reasonably good design.

THE Institution of Automobile Engineers (of England) has resorted to examinations to determine the fitness of candidates for associate membership. In the first examination 9 per cent failed to pass, which is, of course, a very moderate proportion. However, of the probationary graduates who sat for the examination 50 per cent failed. Many of these had not completed their studies, and they will be given another chance later.

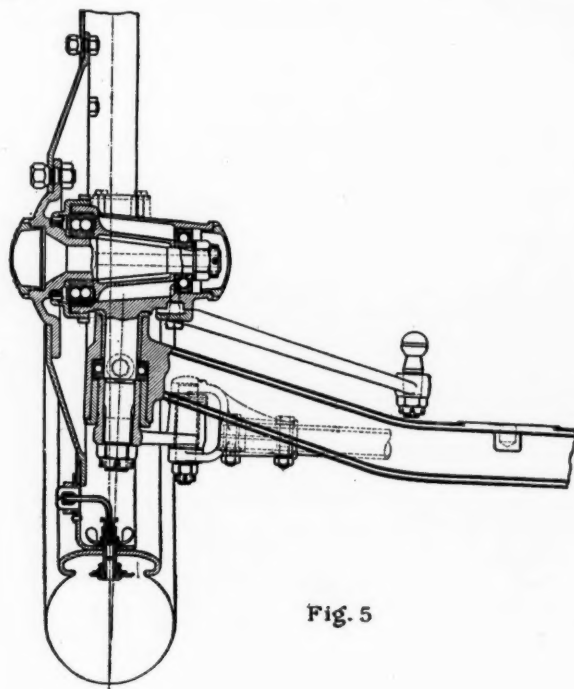
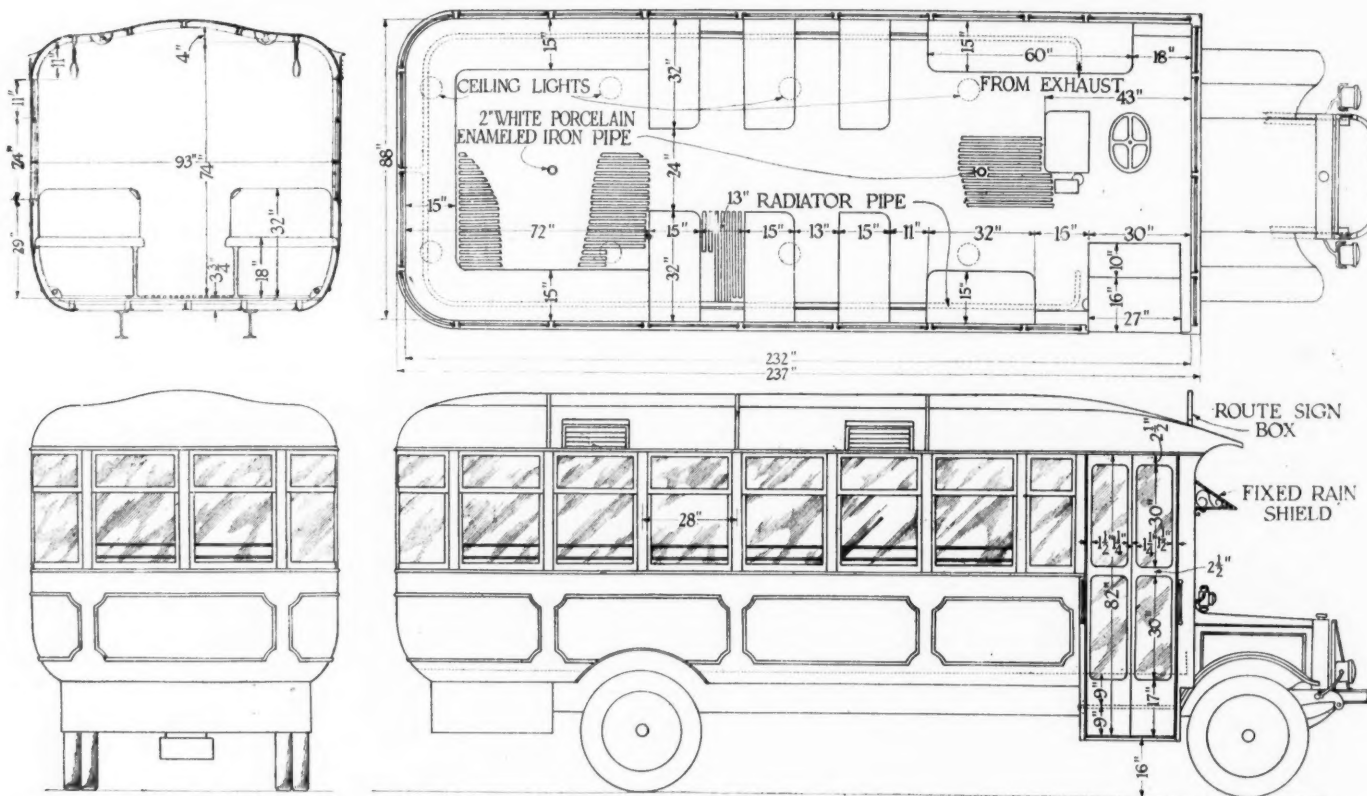


Fig. 5

Proposed Design for Municipal Bus

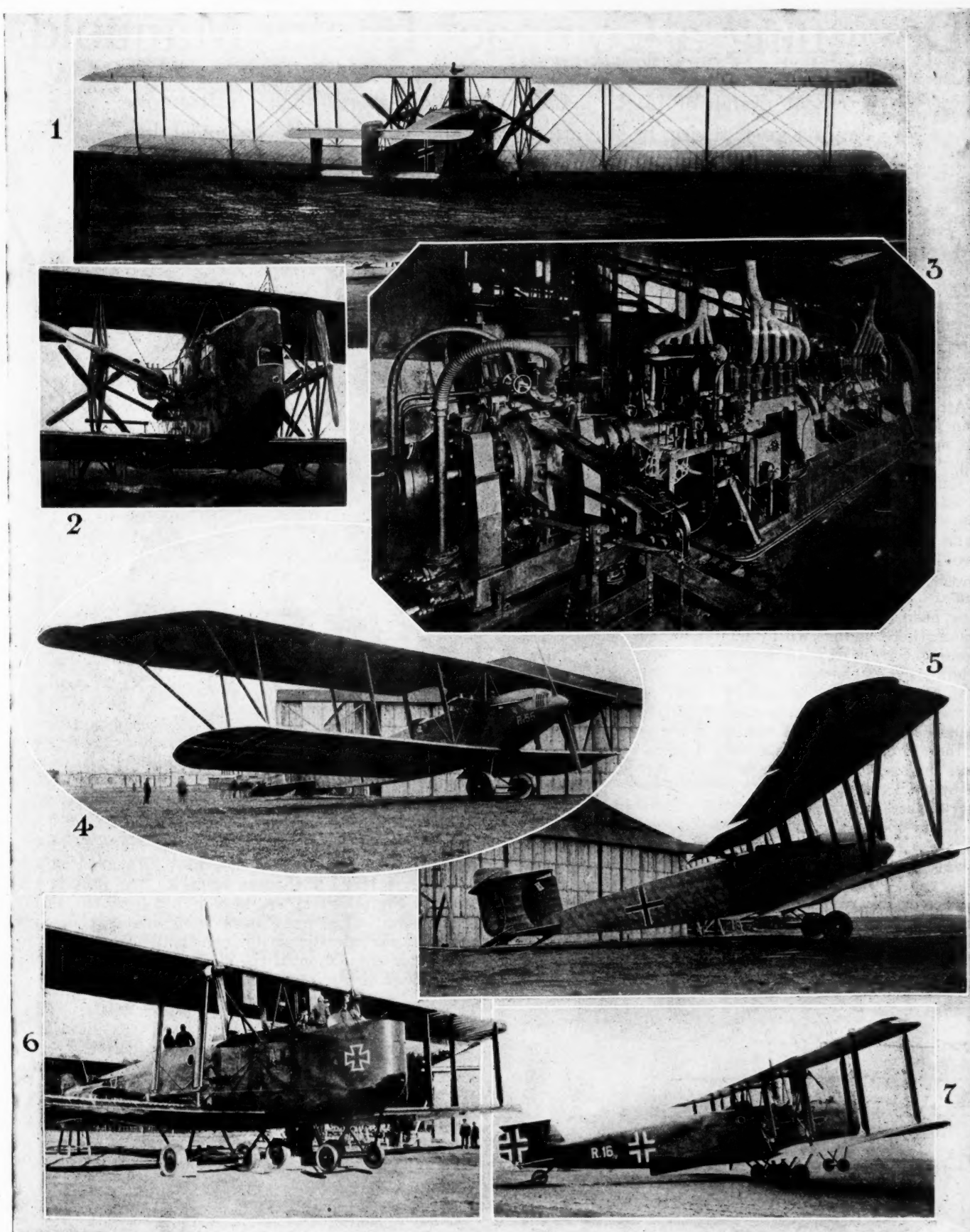


This body was designed by the Bureau of Plants and Structures of New York City and intended to be placed on the ordinary truck chassis. It is constructed largely of metal. Note the provision for standing passengers and exhaust pipe radiator

THE announcement has been made from Naples that, in the opinion of American officials in Italy, more Italians will emigrate to the United States this year than in the record year of 1913, when 375,000 left that country for America.

THE Canadian Government has adopted an Order in Council providing that no immigrant from foreign contiguous territory shall be permitted to enter unless he has, over and above his transportation charges, \$250 in money. This is due to unemployment in Canada.

German Airplanes with Fuselage Engines



1—Rear view of the six-engined Siemens-Schuckert. This machine has six 300-hp. engines. The pusher propellers are driven by two engines each. 2—Front view of center section of the Siemens-Schuckert. 3—The four engines of the Linke-Hofmann R-II on the test stand. The propeller shaft terminates in a large gear, on which all four engines act. 4 and 5—Front and side views of the Linke-Hofmann R-II. Note similarity in general outline to an ordinary two-seater. 6—Front view of Deutsche Flugzeug Werke four-engined plane. The engines are in pairs, one above the other on each side. 7—Side view of the same.

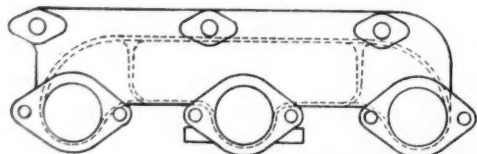
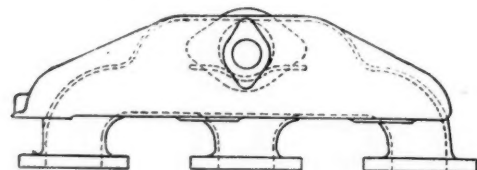
Designing a Compact Intake Manifold

A recent design of intake manifold for the Liberty six aircraft engine shows a great saving in size and at the same time is more economical than the standard model. The value of compactness is not confined to airplanes but is also of value in automobiles. Other features are similar.

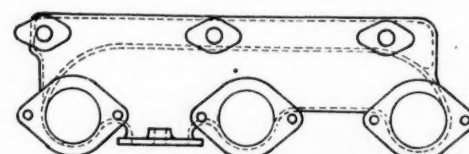
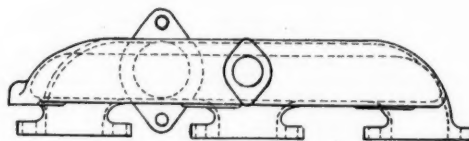
COMPACTNESS of intake manifolding is generally desirable not only in airplane practice but in automobile engines in order to secure the least possible installation space. Some noteworthy designing work has been done in this respect by the Air Service Engineering Division at McCook Field, Dayton, Ohio, on the Liberty six-cylinder engine. The photographs and test curves herewith illustrate the old and new types of manifolds, together with the results obtained with each, and it is apparent that the gain in compactness has been made without sacrifice of output.

The head area of the Liberty six aviation engine with the standard assembly of intake headers is unnecessarily large and in certain types of airplanes interferes with the machine gun installation. Special intake headers, therefore, were designed to reduce the overall size of the engine assembly and to adapt it better to the desired installation.

Both the special and the standard intake headers are aluminum castings water jacketed at the top. The drawing, Fig. 1, shows the construction of both types. The standard headers have three short branches which are fed from a central inlet. A baffle plate is placed in front of the inlet from the carbureters, forcing the gas to take a sharp turn to pass into the center branch. The central inlet permits interchangeability of front and rear headers.



OLD TYPE STANDARD INTAKE HEADER



NEW TYPE SPECIAL INTAKE HEADER

Fig. 1—Construction drawing of standard special compact intake header for Liberty Six engine

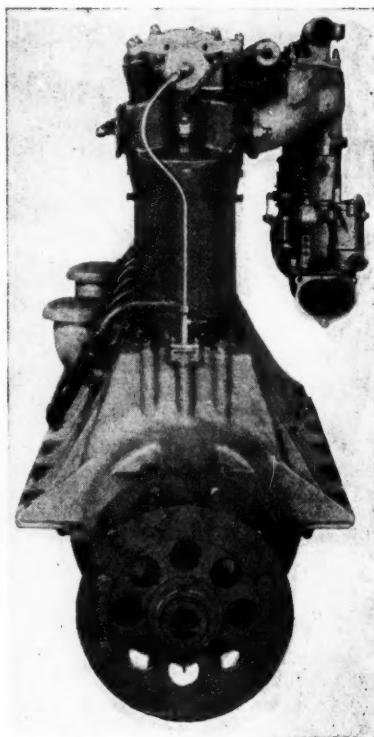


Fig. 2—Standard type of intake header

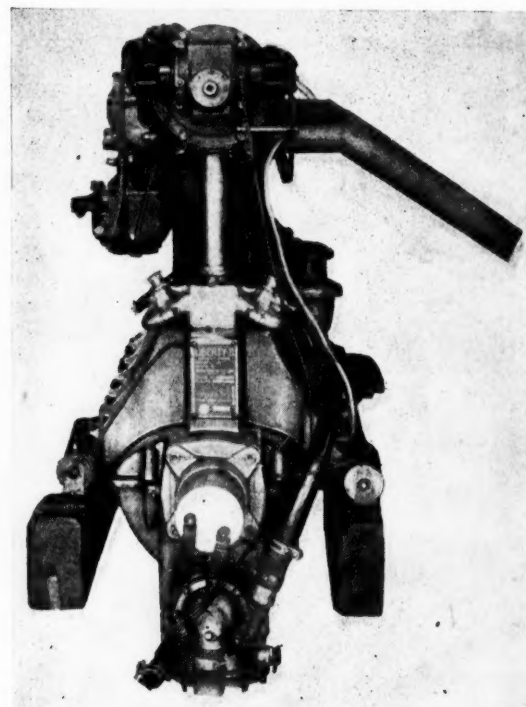


Fig. 3—Compact type of header, showing nearness of carburetor to cylinders

The special headers are of the modified Mercedes types. Unlike the standard headers they have no baffle and are free of sharp turns in the gas passage. The inlet is not located at the center of the header, but between two of the branches. This necessitates front and rear headers which are not interchangeable. In both assemblies, the entire water circulation of the engine passes through the water jackets of the intake headers.

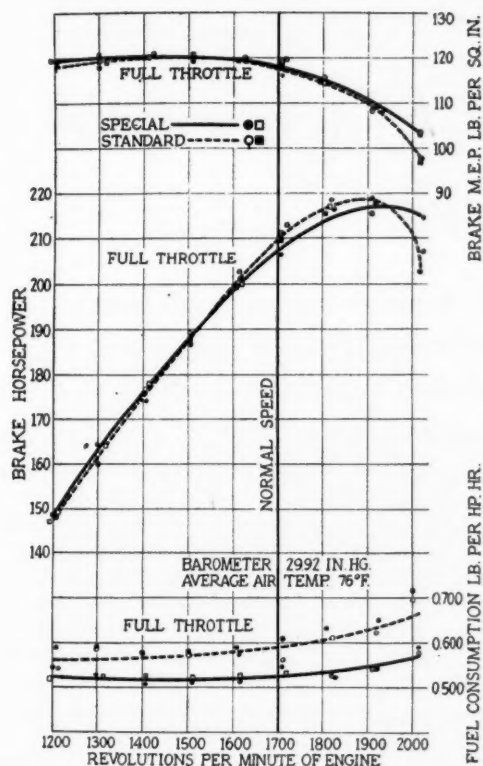


Fig. 4—Performance curves of Liberty six-cylinder engine with special and standard intake headers. The special header is shown by the full line and the standard by the dash lines

As can be seen from the drawing, Fig. 1, and the end view photographs, Figs. 2 and 3, the special intake headers are much more compact than the standard headers, and carry the carbureters closer to the cylinders. The reduction in head area effected by the use of the special assembly is considerable, and the installation of machine guns facilitated. The water connections to the engine and radiator are not rearranged and require few special parts. The special intake headers are free of sharp turns and baffles, thus reducing the probability of gas eddies and resultant uneven distribution. The water jacketed area of both headers is practically the same.

Within limits of experimental error, the power performance with the two headers is the same. The special headers show a slightly flatter curve at the peak, which may possibly be due to higher volumetric efficiency. The specific fuel consumption obtained with the standard intake headers was slightly higher than normal. This is not attributed to the type of header used, but was probably caused by an inoperative altitude control. The difference in fuel consumption was insufficient to affect the power results.

Sizes of French Farms

THE French Minister of Agriculture divides all farms in the country into five classes, as follows:
 2,087,851 very small farms of less than 2.5 acres.
 2,528,713 small farms of 2.5 to 25 acres.
 745,862 moderate sized farms of 25 to 100 acres.
 108,453 large farms of 100 to 250 acres.
 29,547 estates of over 250 acres.

Long Stroke Tire Pump

WITH the advent of the pneumatic tired truck the problem of tire pumps capable of pumping against the high pressures required has become an important one. We show herewith a couple of views of a power air pump specially designed for this work, which is manufactured by the Motor Starter & Air Pump Co. The pump is of the single-cylinder type with a trunk piston fitted with self-expanding cast-iron rings. This piston connects through a long connecting rod having a ball and socket joint at the top end, with a single armed lever pivoted in the crankcase. This lever is in the form of a bell crank, and the fulcrum of the bell crank connects by a link with the crankpin of the pump. The object of this link and lever motion is to obtain a long stroke and yet keep down the over-all dimensions of the crankcase to a minimum. The large pump has a bore of $2\frac{1}{4}$ in. and a stroke of $3\frac{3}{8}$ in. A smaller size for smaller tires is also made.

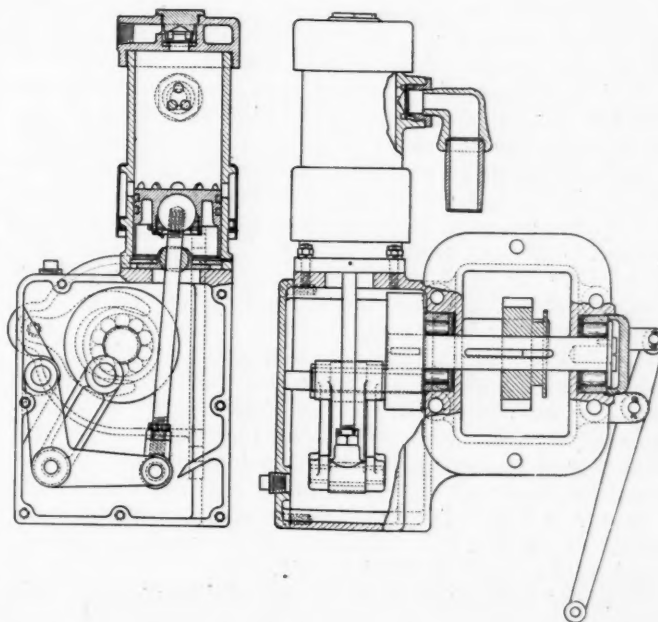
The notable features of the pump are the long stroke, the roller bearings, and an adjustable connecting rod which minimizes the friction against the cylinder walls, and consequently the wear. The piston rises flush with the top of the cylinder on every stroke, which permits of pumping against very high pressure, and it is claimed that the air pumped is absolutely free from oil. This pump is said to be exceedingly rapid in action and sufficiently robust in construction to stand up to the work.

By means of the adjustable connecting rod the piston can be made to come up even with top of the cylinder, leaving only the clearance in the head. This means that at every stroke fresh air is taken in, which tends to keep the cylinder from becoming excessively hot.

The almost straight up and down movement of the piston rod reduces the wear of the cylinder walls. Oil is excluded from the cylinder by the slide on the connecting rod, and consequently no oil can be discharged into tire.

The inflating speed, of course, depends upon the r.p.m. at which the pump is operated. An air reservoir is provided on the cylinder head to take care of the discharge of air from the cylinder at high speed. This chamber acts as a receptacle for the hot air.

All parts of the pump except the piston run in oil, and are lubricated by splash. The pump is designed for application to the transmission power take-off, S. A. E. mounting, but can be attached to the propeller shaft where there is no opening in the transmission.



Electro-Deposition in Automotive Repair Work

This is a lesson from the practice of the British Army overhaul shop that should be valuable to the entire industry. The building up of such parts as stub axles and ball race housings was accomplished quickly and efficiently, in a manner that sustained later wear in war activities.

By B. H. Thomas*

THE repair shops of the British army during the war greatly felt the need for some form of "putting on" tool. Such parts as stub axles, ball race housings and a lot of others, when worn down must either be built up in some way, allowed to continue slack or be scrapped. The process of electro-deposition was resorted to and it was found possible to deposit a layer of iron up to about 2 mm. (5/64 in.) in actual thickness on any simple cylindrical surface of wrought iron or steel, mild or cast.

If properly done, this layer is firmly adherent, and it is practically impossible to chip it away from the base metal with hammer and chisel. It is deposited direct on the surface without "coppering" first, and can be subjected to red heat without apparent deterioration. It can be carbonized and hardened in the ordinary way, and thus treated, under favorable conditions, appears to associate itself so closely with the base material that the dividing line shown in microphotos of the untreated deposit passes away.

Properties of Deposited Layer

The layer presents an extremely smooth surface, and the thickness put on in a given time can be predicted with considerable accuracy. It can be filed or ground, and takes a high finish. Its wearing qualities on a fast-running journal are, as far as the author knows, untried, but it is perfectly satisfactory on such parts as brake and clutch shaft ends, starting handle spindles, etc., which wear considerably in their brackets, and there is no obvious reason why it should not be satisfactory for building up worn journals. The chief limitation of the process seems to be the inability to deposit satisfactorily on such materials as cast iron or aluminum. It is quite possible to deposit copper on aluminum parts, but such deposits are not permanently adherent. This is unfortunate, as, if it were possible to deposit an adherent coating of iron on such parts as worn gearbox ball race housings, etc., the scope and usefulness of the process would be greatly increased.

The practice of putting on a copper deposit was not thought worth while, as the same end was achieved more easily by simply coppering the outside of ball races where necessary. This, of course, had the obvious disadvantage of rendering such parts non-standard. At the same time, however, it was in many cases the only way of saving a valuable part, and infinitely preferable to tinning or nurling up. Quite possibly, further research would produce the desired result.

From the autumn of 1917 to the spring of 1919 over

6000 parts were reclaimed. It is not necessary to enumerate all, but the following are typical:

Stub axle arms.—Two bands of deposit put on to bring the arms up to a tight fit in the ball races.

Steering swivel pins, brake and clutch shaft ends where worn in the brackets.

Change speed lever shafts where worn on the sliding shaft.

Starting handle spindles.

Insides of wheel hubs, where the housings have worn slack on the ball races.

Various shafts on which ball races are required to fit, including magneto armature ends.

Outside of axle tubes which wear in the saddle brackets.

Universal joint pins which wear loose in their housings.

In very many cases the car came back to the shops after a period of use sufficient to make a complete overhaul again necessary, and it was possible to examine the behavior of the deposits under severe conditions. Such examinations have confirmed the view that the deposited parts should stand up perfectly satisfactorily in service.

The following is a brief tabulated list of essential plant and apparatus, which will help to give some idea of the size of the installation.

Depositing Benches.—2 double, in batteries of 12 vats per side, thus giving a total of 48 vats.

1 large separate vat for doing simple repetition work, such as pins and bushes in quantities.

Machine Tools.—1 Universal Grinder, internal and external.

1 Lathe, screw cutting, about 6 in. centers.

1 Polishing Head for buffs and scratch brush.

1 Wolff electric drill.

Miscellaneous.—1 Earthenware sink with drain.

2 Large cleaning vats fitted for electrolytic cleaning.

1 Extra large vat for decantation of the iron solution.

2 Wax containers, steam heated.

1 Set fine chemists' scales.

1 Set graduated beakers (c.c.).

1 Burette for Titration.

1 Set mm. micrometers, internal and external.

3 1/4 hp. electric motors for rocking anodes.

1 Set of accumulators coupled in groups for 12 volts, 8 volts, 4 volts, 2 volts and arranged for charging.

Instrument boards, resistances, vices, small tools, etc., etc., which need not be specified in detail.

*Extract from a paper read before the Institution of Automobile Engineers.

Details of Depositing Bench.—The essential parts are as follows:

Double pole switch, 4 way, giving 2, 4, 8, 12 volts.

Double pole switch, 3 way, giving (a) direct to bath; (b) through 10 amp. ammeter; (c) through 2 amp. ammeter.

Resistance, adjustable.

Clock face for recording the times of putting on and taking off the work.

Plugs and sockets for recording the days of putting on and taking off work.

Ammeter.

Cross shaft carrying rocker arms with anodes.

Adjustable holder for the work.

Depositing vat (wood, pitch lined).

Terminals for connection to the bath.

The cross shaft receives its motion through an eccentric driven by means of a $\frac{1}{4}$ hp. electric motor with reduction gear, fitted under the bench.

Fig. 1 shows the essentials and the internal connections diagrammatically.

Heating Apparatus.—It was found essential to provide means for keeping the shop at a reasonably even temperature, as otherwise in cold weather the deposits became brittle and badly adherent. Eventually, therefore, steam heat was installed and kept going night and day when necessary.

Cleaning and Preparation.—The efficient cleaning of the work is naturally of the highest importance, and is, indeed, almost the crux of the whole process. It may be divided into seven stages, which are tabulated as follows:

- (a) Gasoline.—To remove the coating of oil or grease which is the usual condition of parts sent in for reclaiming.
- (b) Caustic Soda Boil.—Made up of—
Caustic soda.....50 grams.
Washing soda.....50 grams.
Water.....1 litre.
Temperature.....90° C. approx.

This operation may take twelve hours or so. Attempts to improve the action of the bath by making it electrolytic were inconclusive.

(c) Mechanical.—After rinsing off the caustic soda the parts are cleaned as thoroughly as possible with scratch brushes.

The portions not to be deposited on should now be waxed (see later).

(d) Gasoline.—After which, if the parts are not able to be passed straight to the depositing bench immediately after the final cleaning processes, they should be covered with a protecting coat of organic grease and laid aside, such as:

Tallow.....50 per cent.
Linseed oil.....50 per cent.

(e) Alkaline Electrolytic.—After wiping off the grease from (d), the parts are made the cathode in a second soda bath similar to (b), but at normal room temperature. Current 30 to 50 amps. for three minutes, using a sheet iron anode.

The fluid film left on should not be allowed to dry.

The parts are then washed in running water and passed on to (f).

(f) Acid Electrolytic.—The parts are made the anode in a bath made up as follows:

Sulphuric acid.....25 per cent.
Water.....75 per cent.

and a current of 30 to 60 amps. passed for several minutes.

The exact manipulation of this bath depends greatly on the class and condition of the work. If much pitted with rust or scores which do not clean up in three minutes or so, the current may be reversed for another three minutes. The current is then reversed again, and this usually suffices to clean up to a fine white matt surface.

Precautions

(1) The bath must be changed fairly frequently, as the metal dissolved appears to hinder the action, even though the acid may still be fairly strong, and the amount of sulphate in solution small.

(2) The solution should not be stirred, nor the work moved, while the current is passing.

(3) It is desirable to separate the anode and cathode by means of a porous screen to prevent the gas given off from the cathode disturbing the acid round the anode.

(4) When clean, switch off the current, remove the work and swill in running water as rapidly as possible, transferring at once to the depositing bath.

(5) As a rule a current density of anything below

one ampere per square in. is not satisfactory.

(6) The cleaning effect seems to be largely dependent on the free gassing at the anode.

(7) The temperature of the bath should be kept low.

(g) Acid Dip—Before (f) where necessary. Where extra firm adhesion is required, the acid dip is desirable, as microphotos show that the erosion of the surface produced gives a better chance for the deposit to interlock with the base material.

Composition, Nitric acid.... 50 per cent.
Water.....50 per cent.

After a few seconds in this bath, the parts will, on emerging, be covered with a black slime (presumably free carbon). This will clean off easily in the electrolytic bath (f).

Waxing of the Work.—Where a portion of the surface is to remain unaltered, it is, of course, necessary to stop off such parts with wax or other composition.

Either of the following have been found satisfactory in practice:

Beeswax.....90 per cent.
Resin.....7 per cent.
Linseed oil (boiled).....3 per cent.

or

Bitumen.....70 per cent.
Paraffin wax.....30 per cent.

Precautions.—(1) The work should be heated before applying the stopping off compound.

(2) The wax should not be applied too thickly, and the edges should be finished off neatly.

A copper wire lead should now be sweated to the

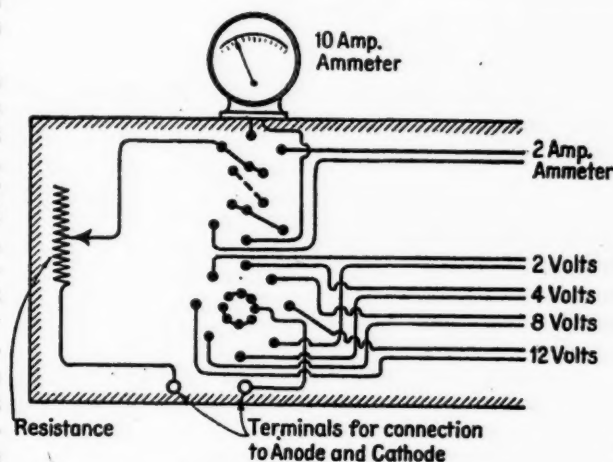


Fig. 1—Diagram of electrical connections

work, and the latter should then be measured up. A convenient method is to use mm. micrometers and make out a ticket to accompany the work, showing.

The amount to be added to the diameter in 0.01 mm.

The finished diameter required.

The total area to be deposited on.

The current to be passed to give the pre-arranged current density.

Deposition.—Composition of the bath.

The solution which yielded the best results was made up of: Ferrous Ammonium Sulphate at a strength of 75 grams per litre of water, with a current density of 30 sq. cm. per 0.1 amp.

The rate of deposition was 0.005 mm. thickness per hour. The operation was carried out in separate vats of approximately 30 litres capacity.

Arrangement.—The general method of operation was to suspend the work in a vertical position in the vat, carrying it by means of standards fixed to the bench provided with universally jointed arms fitted with clamps at the end to hold the work.

The anode was then suspended from the rocker arm and made to surround the work concentrically, as, especially with thick deposits, it appears to be important to keep the anode as nearly as possible equidistant from the work at all points.

If this is not done, the deposit on the side nearest to the anode tends to become thicker than the other.

Construction of the Anodes.—These were made of Swedish iron wire about 16 S.W.G., thoroughly annealed, and wound into the form of a woven cylinder.

They were suspended and stiffened by means of a 1/4-in. iron rod on one side which was attached at the top to the rocker arm.

The anodes were fitted in addition with two celluloid cones to produce an upward pumping action. The effect of this action is important, as it is essential to avoid having stagnant solution in contact with the work, and it is also desirable to keep the ferrous carbonate in the solution in a state of suspension.

Operation of the Bath.—After completion of the cleaning processes already detailed, the work is transferred to the depositing vat as rapidly as possible and electrical contact made at once. It is important to get it immersed before the water film from the last cleaning has had time to dry, and also to start passing the current at once. The current is adjusted to the pre-arranged value by means of the variable voltage switches and adjustable rheostat provided.

The constancy of the current is a matter of supreme importance, and it is essential that the source of supply, and the electrical arrangements generally, should be entirely satisfactory, and that the current value is checked frequently. This point will be emphasized later under "Lines of Growth." It should be remembered in this connection that some work may be on the bench for as much as a fortnight, though the majority of jobs would average one or two days only.

It is interesting to note that with careful treatment very long jobs such as the above have been found, at the end, to be within 2 1/2 per cent of the calculated thickness.

The necessity of keeping the anodes in an annealed condition has been pointed out already, also the importance of efficient agitation.

In addition, the anodes should be kept clean by scrubbing off the black slime which tends to collect on them.

Manipulation of the Depositing Solution.—In the ordinary course, it has been found desirable to settle and decant the iron solution every three to five days. This

removes the collection of oxides and foreign matter, which is apt eventually to cause roughness of the deposit. Another most important point is the temperature of the solution, which should not be allowed to fall below about 68 deg. F. The effect of low temperature is to cause brittleness and bad adherence of the deposit.

Acidity and Current Density.—As the result of much experiment, it was decided that, for our purpose, the most satisfactory method was to work the solution as nearly neutral as possible, and for all thick deposits to keep the current density down to 30 sq. cm. per 0.1 amp.

This decision was taken with reluctance, because some authorities have advocated working with a strongly acid solution, and much greater current density. The latter point is, of course, a great attraction owing to the saving of time effected.

It was found impossible in our experience, however, to get consistent results by this method, as the acid solution was found very unreliable and difficult to work. Consequently it was abandoned for the time being in favor of a neutral solution and low current density.

During working this solution always tended to become acid, and when this occurred it was found that the deposit became hard, bright, brittle and non-adherent or badly pitted. In order, therefore, to reduce the acid content, an addition was made from time to time of freshly prepared and well-washed ferrous carbonate, which served to keep the bath in a satisfactory working condition.

The foregoing represents the process, and although it has been set out in some detail, it is necessary to point out that the determining factor of it all is the personal equation. An inefficient operator will make little or nothing of it, though in skilled and sympathetic hands the process can yield very valuable results.

Causes of Failure.—Some of the most common defects met with are as follows:

Bad Adherence.

Usually due to faulty cleaning, acidity of solution.

Too low temperature of solution.

Roughness.

Lack of efficient agitation of anode.

Foreign matter in iron solution due to dirt and dust from the atmosphere and too infrequent decantation.

Too high current density.

Brittleness and Splitting of the Deposit, also Pitting.

Acidity of solution, too low temperature.

Excessive Banking at the Edges.

Too much agitation of anode.

Too high current density.

Tree Growths.

Too high current density.

Foreign matter in the solution.

Layers or Concentric Strata.

Due apparently to interruption or excessive variation of the current density.

This point was, however, not entirely cleared up, and may also be affected by the addition of ferrous carbonate to the solution.

Excessive Departure from Calculated Rate of Deposit.

Variation of current density.

Formation of tree growths, which, once developed, absorb an increasing proportion of the energy of the bath.

ACCORDING to an article in *La Technique Moderne*, certain steel makers have considerably improved the quality of their spring steels by the addition of tungsten in small proportion, not exceeding 1 per cent.

Effective Time Study Methods Increase Individual Production

Whether working forces are above or below normal, high production per man is desirable. The influence of time study methods on this factor of production is stronger than is sometimes believed. The methods used by an automobile manufacturer are described in the following article.

By Norman G. Shidle

A DEFINITE and important relation exists between the methods of the time-study department and production per man. A workman will produce his best only when he knows that constantly increased production on his part means permanently increased reward. It is not possible to cut piece rates and maintain a high production per man. The practice of cutting rates creates a wide-spread psychological reaction in the minds of workmen, affecting those not only on the job cut, but others throughout the shop. Stable piece rates cannot be maintained profitably, on the other hand, unless they are originally set on the basis of an accurate and carefully made time study.

Thus the work of the time-study department becomes of vital importance. Individual labor achievement is the largest single factor in meeting competition; the manufacturer who is able to obtain from his workmen the highest output per man will be in the best position to meet any competition which may arise in slack periods and to meet quantity production requirements in times of great demand. And since the time-study department is probably the most important factor in obtaining or discouraging the attainment of high individual production, the accuracy and intelligence of its methods are of peculiar interest. The time-study department developed at the Packard Motor Car Co. affords an excellent example of effective practice.

To understand thoroughly the work of the time-study department at this factory, a brief outline of the system of wage payment is necessary. A premium system replaces the regular piece-work plan more generally in use throughout the automobile industry. In a general way, the principle of the premium system is that a certain standard time should be set for each operation; when the workman performs the operation in less than that standard time, he is paid a premium varying certain proportions to the time which he saves. The particular premium system used here is the Rowan system, which is based upon the following principle. **The per cent of premium earned equals the per cent of time saved.**

Thus each man is hired at a certain hourly rate, for instance, 60 cents an hour. Suppose the standard time for his operation to be 20 hours, and that he finishes it in 16 hours; that is he saves 4 hours.

4 hours is 20 per cent of 20 hours.

The premium earned is 20 per cent of 60 cents or 12 cents an hour.

In this particular case the man would have earned during the 16 hours, \$9.60 without the premium, while with

the premium he earns \$11.52. Thus the premium amounts to \$1.92. The formula used in calculating the premium is this

$$\frac{\text{Elapsed Time} \times \text{Gained Time}}{\text{Standard Time}} = \text{Premium Hours Earned}$$

The number of premium hours, multiplied by the hourly rate, then gives the premium. This is simply another way of obtaining the same result as described above.

This brief description is enough to indicate the real task of the time-study department. It is not concerned with rates nor rate setting; it is concerned only with setting a standard time in which the job can be done by the average workman. Having done this, its work is completed insofar as it has to do with the man's rate. The employee's earnings, it is obvious, depend chiefly upon his base rate, the setting of which is discussed later in the article.

Standardization of information concerning the various machines is the first step in the work.

Certain standard information concerning every type of machine is compiled as the result of measurements, experiments and tests. The data so obtained concerning a machine—Reed-Prentice 20" Standard Engine Lathe, for instance—is recorded on a machine data sheet. Fig. 1 illustrates a typical sheet. The information here recorded enables the time-study department to know exactly what that particular type of machine is capable of accomplishing.

A code number is given to each machine; similar machines bearing the same code number. This number appears on the machine data sheet in the upper right-hand corner opposite the words "Machine Class." In the case illustrated, the code number is 21BAHF. This number is given to every other machine in the shop capable of doing the same work at the same rate. In the column headed "Master Record," on the extreme right of the machine data sheet are listed all the machines to which the code number 21BAHF is applicable. Thus, similarly coded machines have the same standard time for completing any given job. Consequently, the time-study department is able to set standard times accurately for any one of the machines on any of the jobs it is capable of performing merely by reference to the machine data sheet and to the time study sheet previously compiled for the specific job. Since this is to be done, however, great care and accuracy are necessary in making the tests and correlating the original data which goes to make up the machine data sheet. Such accuracy has been observed in all cases, with the result that the system operates successfully; otherwise a mistake made in

LINE SHAFT SPEED 240 R. P. M. LESS 2% 235 R. P. M. SIZE OF BELTING 3-1/2 1/4 ADD, 2 IN. DIA. OF PULLEY ON LINE AND COUNTERSHAFT Size of pulley on Line Shaft 14 x 4 crown driving a 12 x 4 on countershaft $\frac{14.25}{12.25} = 1.165$ Line shaft to countershaft RATIO. $\frac{10.25}{16.25} = .630$ Cone # 1 $\frac{12.25}{14.25} = .860$ Cone # 2 $\frac{14.25}{18.25} = 1.164$ Cone # 3 $\frac{16.25}{10.25} = 1.585$ Cone # 4 $\frac{36 \text{ T} \times 26 \text{ T}}{108 \text{ T} \times 100 \text{ T}} = .0867$ Gear Ratio (Back Gears) $1.165 \times 235 = 273$ R.P.M. Speed of Countershaft.		NAME OF MACHINE ENGINE LATER MACHINE CLASS 21BAHF REED-PRITCHETT (30" STANDARD) ENGINE LATER Four cone drive. One speed countershaft. Standard carriage. Swing over ways on bed-----11" Swing over plain rest-----15" Swing over compound rest-----14-5/8" Swing over plain taper rest-----12-1/4" Spindle nose-----3" dia. x 6 threads. Dia. of hole thru spindle-----1-1/8" Max. distance between centers-----42" Length of bed-----96" Tool posts will take 1-1/4" x 5/8" tools Recommended speed of pulley on countershaft-----140 R.P.M.		MASTER RECORD MACHINE No. DEPT. 1738 DH 1411 DH 3467 DC 4354 WDC 3171 DR 2812 LM 3674 CDA 436 DA 1177 UDA 2176 DB 1173 DB																																																																																																																																														
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Fig. 1—Machine data sheet

the beginning would then follow through every time set.

The cross section headed "Load Hours" on the machine data sheet is used for making a graphic chart of a machine load. The machine load is found by using the standard time of operating and adding to it 25 per cent.

The code number is useful, too, in routing production, since the capabilities of each machine and its availability for work of certain kinds can be determined by reference to its code number. This, however, is not pertinent to the discussion as related to purely time study work.

The tests made in compiling the information for the machine data sheet, then, determine accurately the best adjustment of the machine to accomplish a maximum of production with a minimum of wear and tear. The time-study department standardizes on the pulleys that are to be used in order to give each machine a certain speed. Neither these pulleys nor the internal gearing of the machine can be changed without the approval of the time-study department. Neither the workmen nor the foreman has authority to make such regulations, since the best adjustments have been determined through a series of careful tests, and

production cannot benefit through promiscuous tampering.

The full authority of the time-study department over adjustment of machines is felt to be necessary, since that department is responsible for equitable standard times.

To illustrate clearly the methods used in actually completing the time study it will be of advantage to take as an example a specific piece and some of the specific operations on that piece. For this purpose, the work on the rear axle shaft driving ring may be used.

On the "Operation Sheet" shown in Fig. 2 are listed the various departments to which the rear axle shaft driving ring must go, together with the operations to be performed upon it in each department. Time studies must then be made for each of the operations listed.

Fig. 3 illustrates the "Observation Sheet" on which have been recorded the observations of the time-study man for the second operation performed in department CDA—operation 218. The time study man takes his observations with the full knowledge of the workman that the study is being made. He may make anywhere from two to ten observations, depending

OPERATION SHEET			
OPERATIONS TO BE PERFORMED IN ORDER WRITTEN			
Job	3-20-20	Replace lens	2-14-20
Draw	3-20-20	Part No.	5
Name	REAR AXLE SHAFT DRIVING RING		
Model	5-65: EF.		
Used for Parts or Assm.	Rear axle		
Made from	#340 Steel D. Forg.		
Part No.	D-4613		
Dept.	Code	Operations	
RJJ	001	Heat & quench	
RJJ	002	Heat & draw	
	0-8	Inspect & count	
NOTE-----ABOVE RJJ OPERS FOR OUTSIDE STOCK ONLY			
CBO		Store	
CDE	511	Sand blast	
	0-1	Count	
CDA	225	Finish face one side	
	218	Finish face & bore opposite side	
	219	Chamfer large hole	
	161	Drill & e'bore six holes	
	226	Turn O. dia & chamfer	
	271	Rough broach four slots	
	272	Second rough broach four slots (This oper used on this part number only)	
	273	Finish broach four slots	
	411	Remove burrs & chamfer slots	
	0-8	Inspect & count	
CBO		Store finished	
CFA		Assemble	
NOTE--New models added.			

Fig. 2—Operation sheet

Dept. CDA Observation Sheet Piece No. 58027
 Date 2-23-20 Mach. Name and Number #744 Red lathe with turret attachment Oper. No. 218
 Name of Piece Rear axle shaft driving ring Material #R3 Steel D.F.
 Description of Operation Finish face opposite side and bore

Description of Sub-Operation	1	2	3	4	5	6	7	8	9	10
1 Pick up piece	.05	.05	.06	.06	.05			.05		
2 Place in chuck and tighten same	.90	.88	.91	.90	.87			.85		
3 Start machine	.93	.91	.94	.93	.90			.03		
4 Run tool to work and set	1.28	1.26	1.27	1.26	1.25			.35		
5 Tighten carriage	1.39	1.38	1.40	1.39	1.39			.11		
6 Engage feed	1.41	1.41	1.43	1.41	1.38			.02		
7 Face one side	8.20	8.25	8.29	8.24	8.15			6.79		
8 Bore hole while facing side	X	X	X	X	X			X		
9 Disengage feed	8.42	8.46	8.51	8.43	8.37			.22		
10 Run tool back and chamfer hole	8.70	8.73	8.76	8.73	8.65			.28		
11 Run carriage out of way	8.85	8.87	8.90	8.87	8.80			.15		
12 Stop machine	8.88	8.90	8.94	8.90	8.82			.03		
13 Loosen chuck	9.18	9.20	9.27	9.19	9.14			.31		
14 Remove and lay piece on floor	9.25	9.26	9.33	9.24	9.23			.06		
								9.25 Average		
15										
16 Tools used										
17 1. Forged tool - PW-34G										
18 1. Plot boring bar with adjustable blades										
19 1. Three-jaw chuck										
20 1. Open end wrench										
21										
22 1/2 to 3/4 stock to remove from face										
23 1/4 stock to remove from hole										
24										
25 80 Min - Misc & Tool Trouble										
26 40% added										
27										
28										
29										
30										
31										

Man's No. 107 Qualifications Good Observer's Winfield

Fig. 3—Observation sheet

Dept. _____ Mach. No. 744 Time Study
 Date _____ Mach. Name _____
 Name of Piece _____
 Description of Operation _____

Piece No. 58027
 Oper. Code 218
 Material #R3 Steel D.F.

Description of Sub-Operation	Branch of Storage	Tools Used	Speed	Feed	Time per Piece	Time per Hour
1 Pick up piece						
2 Place in chuck & tighten same						
3 Start machine						
4 Run tool to work & set						
5 Tighten carriage						
6 Engage feed						
7 Face one side						
8 Bore hole while facing side						
9 Disengage feed						
10 Run tool back & chamfer hole						
11 Run carriage out of way						
12 Stop machine						
13 Loosen chuck						
14 Remove piece to floor						
15						
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100						

Set-up Time .75 hrs.
 Remarks _____
 Standard Time .250 hrs. 1 Man
 Observer Winfield
 Dept. Foreman C. Yang

Fig. 4—Time study sheet

upon his judgment of the intricacy of the operation, the honesty of effort on the part of the workman, etc. Usually about five observations are made.

The observations include an analysis of the various sub-operations or movements of the workman. Each of these is recorded and separately timed, the results being recorded in hundredths of a minute on the "Observation Sheet." After the operation has been timed five times, an average time is calculated; in the case illustrated, the average time is 9.25 minutes. An allowance is then made for tool trouble and miscellaneous interruptions. To this total is added a certain percentage of allowance which varies with the judgment of the observer as to how nearly the operator has come to a normal average performance. There is not, in reality, a large variable factor here for two reasons. First, the machine has been so adjusted in the beginning that it is possible to determine rather closely what it is capable of producing under normal circumstances, and second, the observer is always a skilled worker on the machine which he is observing; thus he can run the job himself for a while, if necessary, in order to determine the percentage which should be allowed.

On the observation sheet appear also a list of the tools used and the amount of stock normally necessary to remove. From the results re-

corded on this sheet, the "Time Study Sheet" is filled out. This form bears practically the same information as the observation sheet, except that it lists only the results of the observation; not the details of how those results were reached. The "Time Study Sheet" is a permanent record of the details of the standard time for the operation. The "Time Study Sheet" shown in Fig. 4 has been prepared from the "Observation Sheet" shown in Fig. 3; it records the results of the time study on operation 218, "finishing face opposite side and boring," performed on the rear axle shaft driving ring.

Then on a form known as a "Standard Time Record" are written the standard times for all the operations performed on the rear axle shaft driving ring. One of these records is prepared for each department through

which the piece passes. The record illustrated in Fig. 5, for instance, shows the standard time for all operations on this particular piece in Department CDA, the second one listed, 218, being the operation described in detail in connection with Figs. 3 and 4. At the bottom of this form appears the name of the department to which the piece goes after being finished in this case to the finished stores department. Thus on these permanent record cards, the time-study department has at hand the standard times for every operation

CARDS, CARD No.		STANDARD TIME RECORD									
DEPT. <u>C.D.A.</u>		NAME <u>Rear Axle shaft driving ring</u> PIECE No. <u>58027</u>									
Oper. No.	Mach. Class and Number	Date	Set Up Time	Stand. Time	No. of Man Time	No. of Mach. Time	Minimum Daily Product's Rec'd				
225	22B 1050	3-11-20	.333	.183	1	1	40	3-12-20	R.F.P.		
218	21B 744	3-11-20	.50	.250	1	1					
219	21B 610	3-11-20	.167	.017							
151	15B 720	3-11-20	.333	.400	1	1					
226	22B 1050	3-11-20	.42	.227	1	1					
271	27B 241	3-11-20	.333	.090	1	1					
272	27B 281	3-11-20	.333	.082	1	1					
273	27B 810	3-11-20	.333	.090	1	1					
411	41A	3-11-20		.233	1	1					
62											
C.S.B. Store furnished											
RW 10-23M-3-14—Packard Press											

Fig. 5—Standard time record

in connection with each piece which passes through production. This data is then available for use in connection with other machines of the same code number which may be used for performing the same operation.

As indicated by the methods outlined, every precaution is taken, in first setting a standard time, to make certain that the time set is accurate and fair. This having been done, changes in standard times are not made unless a definite change occurs in the operation. In case bad stock begins to come through and a complaint is made, a temporary percentage is allowed to workmen. Simultaneously the time-study department notifies the heat treating department, the forge or foundry—wherever the trouble may originate—and the cause of the bad stock is eradicated at its source. This percentage allowance in case of unusual circumstances eliminates any necessity for juggling or changing the standard times. The workman is certain that he will be allowed to make all the money he can earn through increased production with the standard time set as a permanent basis.

Rates Are Maintained

In this connection the Rowan premium system of payment is additionally useful in that it takes away from the management any incentive to decrease the standard time—to cut rates. A little careful thought in connection with this method of payment as outlined in the beginning of this article reveals the fact that as production increases the price per piece decreases. P. P. Verner, Clerical Superintendent of the Packard Co., in explaining the system recently said, "Under any premium system the workman will earn less per piece as his production rises, but under the Rowan system the rule holds good that whatever percent of the time he saves adds the same percent of his time to the wages which he earns." Later he added, "One of the fundamental rules of the company is that once a standard time has been set it will not be cut unless the method of performing the operation has been changed. . . . The reverse is not true. If a time has been set too low it will be increased."

With such a standard to maintain, it is evident that a heavy responsibility rests upon the time-study department for the accurate and effective carrying out of its work. Such a standard would be impossible, if the time study work were slipshod. The careful analysis of machines and their possibilities eliminate to a large extent the possibilities of error in setting standard time. The variable which will always remain is the machine operator; his ability and willingness to be fair is bound to vary. These two variables are met by the percentage allowance, which is made in accordance with the observer's judgment of the man's ability as related to his attitude toward the job.

Eliminating "Slackers"

In the Packard plant, as in others, the time-study department has been handicapped by the tendency among workmen to consciously slow up while a time-study is being made. This was the natural result of the piece-rate cutting which has been indulged in so extensively by other plants in the past. Years of fair dealing and honest time-setting, however, have reduced this difficulty here very greatly. While a "slacker" is still met with occasionally, the accurate and honest methods of the management and time-study departments during a period of years has so gained the confidence of the vast majority of workmen that this evil, which constitutes the largest variable in careful time-study work, has been reduced to a minimum. This is a practical attainment; not a kindly spoken generality.

In making the nearest possible approach to absolute accuracy, it becomes evident that, even when all possible variables have been accounted for, much depends upon the intelligence and ability of the time-study department staff. Incompetent observers could render utterly ineffective the best system ever devised. Realizing the vital quality of the department personnel, extreme care has been taken in obtaining and training properly qualified men for this work.

Practically every member of the time-study staff saw several years of service in the factory before he became an observer. Every observer is required to be a skilled operator of all the machines which he is to study; he must also have had practical experience on the job, that he may understand the point of view and ideas of the workman. He must, in addition, be able to conduct his observations without causing friction in the organization, either with the workmen or foremen. Thus the time-study staff is built up from within the plant; it is carefully selected from men who have been with the company so long that their qualifications can be accurately judged before they are chosen for the work. And the success which has been attained is attributed largely to the high-grade personnel, composed of men carefully chosen and especially trained for this work.

Setting Base Rates

While the work of the time-study department affects very strongly the incentive offered a man to high production and consequently the human relationship of the plant, the actual work of setting rates at Packard is outside of its scope. Since wages constitute the most important single element in the relation between the company and its employees, they are very properly in charge of the employment department, which is responsible for hiring men, keeping them contented, adjusting grievances, and reducing labor turnover. Since the standard times are not changed, it is obvious that the wages a man actually receives are dependent primarily upon his basic hourly rate of pay. Thus two men doing the same operation, one having a base rate of 50 cents, the other of 60 cents, would not receive the same pay for equal production. This makes it possible to reward old employees for long service and faithfulness, and to base a man's reward upon factors other than actual daily production, such as tardiness, absences, etc. All such things definitely increase or decrease the man's real value to the company, and it is felt that they should enter into determining his wages. It is the practice to so reward men at the Packard plant. Consequently, two men working, for instance, on an engine lathe may have different base rates of pay.

This matter is entirely in the hands of the employment department, which is thus able to fully exercise its function of properly handling and correlating the human factors of the plant. Though not entirely pertinent to the main theme of time-study, it is an important corollary, exceptional enough to warrant special mention in this connection.

A NEW gas for use in the torch for cutting and welding is called Calorene. This gas is expected to be a rival of acetylene for this purpose. It is derived from the manufacture of alcohol and has 1580 B.t.u. per cu. ft. Being an unsaturated gas its effectiveness is as great as that of acetylene. The kerf scale on a 4 in. cut is only 0.008 in. and is easily scaled off. The explosive range is 4 parts with 96 parts air to 14 parts with 86 parts of air, as against from 3 parts acetylene to 97 of air to 70 parts acetylene to 30 of air.



The FORUM

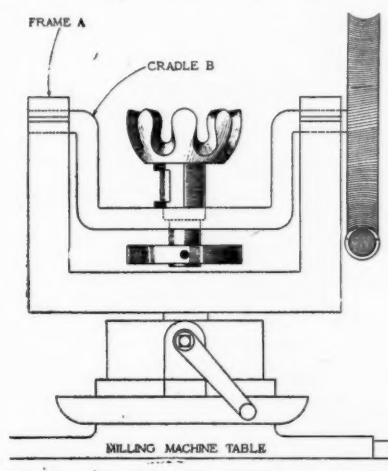


Method of Cutting Spherical Gears

Editor AUTOMOTIVE INDUSTRIES:

IN your issue of July 8 I notice an inquiry as to how to cut a spherical gear for use as a universal joint. Referring to the sketch, A is a frame for the milling machine, having a cradle B mounted therein which is free to turn on its journals. This frame has a worm gear fast on its shaft, engaging with a worm on the frame supported in boxes.

In the cradle is a hole for the arbor or shank of the gear, having an index plate. The gear to be cut is now



placed in the cradle at the proper height, with the center of the gear in the center of the journal. This may be done by placing collars underneath. If enough gears were to be made, a very fine rigging could be made. It is, of course, understood that the hole in the cradle B is absolutely in the center of the axis of the bearings. I have made several hundred spherical gears with $\frac{1}{2}$ -in. face.

F. HEYMANN,
Boston.

Wheel and Hub Standardization

Editor AUTOMOTIVE INDUSTRIES:

THE need of standardization in hub design for automobile truck wheels (as pointed out in AUTOMOTIVE INDUSTRIES) is constantly before us and we will heartily co-operate with any bona fide movement toward this end. Our experience in the standardizing of our own product has developed some very surprising facts about hub requirements for different axles. We have been manufacturing hollow spoke and hollow rim steel truck wheels for many years and our customers use about every type of axle on the market, and a few make their own axles.

Because of this condition and special requirements of different customers, we had more than 100 patterns for solid tire wheels and many others for pneumatic, with no end in sight. Having so many patterns, necessitating removing some to run others in the foundry, caused endless delays and hindered production. This trouble was experienced

in the machine department as well, where it was necessary to change fixtures and tools for wheels on every order.

After considerable investigation, we devised a method of standardizing our pattern equipment whereby we have improved our product, can furnish our customers with wheels meeting their requirements, increase our production and give them the last word in wheel design. We find many of our customers willing and anxious to co-operate, as they realize that whatever improves and increases production for us, is also to their advantage. When we have completed our standardization, about twenty patterns will take care of all types and sizes of wheels.

The following data will show the variation in bearing sizes on 2-ton front wheels for six different axles:

4.332	3.544	3.546
3.982	3.154	.....
3.670	3.154	.....
4.331	3.938	3.539
3.154	2.238	2.593

Diameter Bearing

The following shows similar conditions on 2-ton rear axles:

Diameter bearing	Distance between bearing seats	Taper per ft.	Length of taper	Diam. of taper at large end
Inside	Outside	Distance between bearing seats		
4.724	3.543		4.000	
4.731	4.731	3%		
4.724	4.724	2 12/16	1 1/2	6 11/16
3.984	8.124	3.690		2.739
3.5453	4.7264	3 1/2	3/4	5%
				2.560

GEORGE WALTHER, President,
Dayton Steel Foundry Co.,
Dayton, Ohio.

Planning Service in India

IN a recent communication to AUTOMOTIVE INDUSTRIES, Narandas V. Dossa of 14 Hummum St., Fort, Bombay, outlines his plans for the opening of a salesroom and service station for motor cars. He states that he has obtained the sales agency for two makes of German cars and that he is anxious to sell American cars of all prices and invites correspondence from manufacturers of cars, motorcycles and trucks. He also states that he desires to make a five-year contract with a man familiar with repairs on American cars who is competent to plan, install and conduct a service station for all makes of cars. He desires that this man shall rank in capability with engineers.

Information Desired

WE have an inquiry for the address of the party owning or controlling the American rights to the Dux positive clutch transmission. Any information on this point will be appreciated by the editor.

Glass and Its Unstudied Problems in Automotive Construction

In this article the writer calls attention to a virgin field for research and standardization which must be of interest to every engineer concerned with automotive vehicles. The points to be clarified are those of design, economic production and greater safety in use.

By William Crawford Hirsch

STATISTICS covering consumption of this or that commodity by the automotive industry have been abused so often of late by its shortsighted calumniators that a statement which recently made the rounds of the press placing the 1920 plate glass requirements of automotive builders at in excess of 40,000,000 square feet, coupled as it was with insinuations that to this was to be ascribed one of the chief causes of the high cost of house building, evoked in the automotive industries resentment rather than the logical interpretation that would or, at least, should have been accorded to it otherwise.

If there are 40,000,000 square feet of plate glass consumed annually for automotive purposes, to say nothing of sheet and lens glass, it is high time that the industry as a whole take a greater interest, technically as well as at the purchasing end, in this commodity. The use of glass in automotive construction has grown much like Mrs. Stowe's Topsy. Of steel, aluminum, rubber, yes even of wood, certain exacting duties were required under stress and so very early in the days of the automotive industry's youth, engineers and designers were compelled to make exhaustive studies of these materials with the result that the producers of these raw materials joined hands with them and to this team work the industry is indebted for much of its progress. One need only think of the many alloy and heat treated steels which were wrested from until then unknown processes under the sheer force of the automotive industry's requirements of lightness and durability.

But with glass it was different. When the first horseless carriages made their debut, there was the coach builder who had bought plate glass for his vehicles for many years. And so the first automobile builders followed in his footsteps. True, he built his coaches without the least regard to the standard sizes of plate glass rolled. He would send his window frames to the glass bender and beveler and there they would be fitted regardless of how much waste resulted in having to cut down larger plates.

The carriage lamp maker would spin his lamps first and then buy beveled plates to fit them. Even in his day, he might have saved considerable money by taking the difference in the price of this or that size of glass into consideration in his designs, but these lamp makers were craftsmen and not manufacturers. If a carriage lamp called for glass plates 1/16 in. wider or longer than standard sizes, it was up to the glass beveler to cut down a larger size and, if the rim called for a thickness of glass that would entail much extra labor in roughing and polishing, no carriage lamp maker ever thought of

providing a rim that would obviate this expense; the glass had to be made to fit the lamp, not the lamp the glass. And the automotive industries fell heirs to much of this easy-going attitude in the matter of glass.

From the coach builder's and carriage lamp maker's viewpoint, glass was good when you could look through it and when its appearance was pleasing to the eye. Bubbles, scratches and other defects were as much taboo then as they are now. As a result, the coach builder and carriage lamp maker were looked upon in the glass trade as particular buyers and they paid accordingly for their requirements. Happy coach builders and carriage lamp makers! They lived in an age when chemical and physical laboratories were looked upon as suitable enough luxuries for colleges and universities, but as positive superfluities in manufacturing establishments. They did not dream of a single plant producing 4000 vehicles a day, wherein a saving of 25 cents in the cost of the glass in each unit would add \$300,000 annually to the right side of the profit and loss account.

The progress made in the realm of plate and sheet glass since the days of the coach builder and the carriage lamp maker has been very, very slim. By this it is not meant to imply that the glass manufacturer has not improved his mechanical methods of production. Naturally the last ten years' steady growth of the importance of automotive glass consumption was bound to be reflected to a certain extent in the plate and sheet glass industry. Adaptation, however, was rather along the line of a greater output of the special sizes and thicknesses required in the automotive industries than in any organic improvements in the product itself.

The transformation which automotive requirements have wrought in the steel and metal industries, in the manufacture of rubber and artificial leather, to say nothing of the electrical industry, has not yet materialized in the realm of plate and sheet glass. This is all the more remarkable, as producers of lighting devices are untiring in their efforts to secure the greatest possible amount of translucence and are leaving no stone unturned to make glass assume its full burden in the transmission of the artificial light rays.

In fact, advance has been and is being scored daily in improving the light transmitting qualities of the glass used in the construction of headlamps. This glass, however, from the bulb of the electric incandescent lamp (which is produced by an automatic machine closely resembling the Owens bottle-blowing machine), up to the front glass which is usually pressed in molds, does not

come within the scope of the varieties of glass that this article aims to deal with, i.e. plate and sheet glass. These are, so to speak, the daylight glasses in automobile construction and, as such, call for transparency above all other qualities. Translucence, because of its vital importance in the electric lighting industry, is receiving the attention of the best minds in the ranks of illuminating engineers, but transparency has been accepted so freely as a matter of fact quality in plate and sheet glass that research into what forces will insure it in the most intensified form and how it can be longest preserved has been very meager.

To the automobile windshield, the glass in the rear of the car, and the mirror are its eyes upon which depend to a large extent the safety of traffic. The slightest blemish by which vision is distorted may bring about a grievous accident. The coach builder bought plate glass to keep the rain and snow out and to enhance the appearance of his product. In the automotive industry the part assigned to plate and sheet glass is as vital to safety as the solidity of the driving gear.

Scientific authorities on glass are very few. One looks in vain in Johnson's "Materials of Construction" or Barr's "Industrial Engineering" for glass specifications. A British author, Dr. Walter Rosenhain, vice-president of the British Society of Glass Technology, has recently brought up to date his handbook on "Glass Manufacture," the only modern textbook available on the subject. Its greatest merit lies perhaps in the author's frank observation that "by systematic research it would probably be possible to produce glasses of considerably greater mechanical strength than those at present known." Throughout Dr. Rosenhain's book rings the clarion call for more intensive investigation of glass so that a more serviceable and enduring product may result therefrom. Translated into terms of automotive engineering and designing, this means that, if there prevailed between the automotive and glass industries the same co-operation as between the former and the metallurgical industries in the effort to solve the automotive industries' special problems, there would probably soon be found the ideal plate and sheet glass for automotive purposes, glass which would show the greatest resistance to atmospheric influences so that, especially in mirrors, premature blindness would be prevented and which, moreover, would withstand for the longest number of years the strain of jolts and abrupt stops.

Digressing for the moment from the technical problems which the use of plate and sheet glass in automotive construction involves, the writer would call attention to a purely economic phase of the purchase of these commodities. In normal years, when building activity is not, as it was this year, restrained, much of the plate glass required by the automotive industries can be obtained in the form of strips or other salvage that results from the cutting to size and fitting to mouldings of large plates used in building construction and interior fittings. Supply from this source may not be very prolific for such sizes of plates as are needed for windshields

but for mirrors and rear windows for passenger cars it can be made to yield considerable material.

In this connection designers may do well in having clear in their mind the great waste which the use of oval shapes involves. Of course, this is offset to some extent by the relative difficulty of inserting securely in the top fabric a rectangular shape with its sharp corners, but this obstacle can be overcome much more economically by rounding the corners than by resorting to the wasteful oval. At the risk of being charged by many with stating the obvious, be it recorded for the benefit of the novice that small sizes of plate glass used over the dials of most speedometers and clocks as well as much that is silvered for mirrors, are infrequently cut from miscellaneous accumulations of strips and remnants of larger plates. For the better grade of automobile mirrors and beveled instrument tops, the best from this miscellaneous salvage is selected, hand picked, so to speak, with special regard to freeness from scratches and uniformity of thickness. Whether the purchasing agent buys this glass with his eyes open to its origin or whether he does not, matters little.

In fact, in the present undeveloped stage of glass standards, glass is glass though every plate in a lot of one hundred contain varying percentages of sand, limestone, salt cake and carbon. So long as the plates are free

from scratches and bubbles and uniform in thickness, they are looked upon as on a qualitative parity with a hundred plates that came from one and the same furnace, were poured from the same ladle, rolled on the same table and passed muster in "sorting" by the same cutter.

Nor is there any positive test by which the buyer of plate glass can tell whether a plate has never been used or whether it has and been

repolished and reconditioned following long but careful usage. Of course, there are telltales which the man who handles plate glass day in day out will readily detect, but even he would be perplexed if two plates were laid before him, both ticketed and marked the same way, one straight from the glass factory and the other, carefully repolished after, perhaps, years of service, and he were asked to say which was which.

Many a costly instrument, the maker of which would balk at using in its construction anything but the very purest of virgin metals, is protected against dust by a glass that in a former stage of usefulness served as a photographic negative, later to be stripped of its gelatinous coating and sold as the very finest sheet glass obtainable. And yet, the reason that it could not be re-used for photographic purposes, was the sensitiveness of glass which is such that, in spite of all the cleaning and polishing, it retained a trace of the former image which would have made its reappearance as a "ghost," had it been re-used as a negative. Since the war put manufacturers of negative plates on their mettle in devising ways and means to overcome the shortage in the supply of raw materials, they are reported to have discovered a process that banishes this "ghost" for good. This photo-sensitiveness of glass, however, being only one of many undiagnosed characteristics of glass, would

THE windshield and the auto mirror are as vital and of infinitely greater practical importance than the telescope which the astronomer uses to observe stellar bodies. Is it not then clearly up to the glass and automotive industries to join hands in an effort to wrest from the chemical and physical laboratory, from the furnace, the rolling mill, the polishing shop and the silvering room the ideal material for the automobile's optic nerve and then to standardize it so that it will stay "put"?

seem to indicate that thorough research into the properties of glass with special reference to its use in automotive construction, would reveal much of importance.

Imperfect as our present-day knowledge of glass is, the exigencies of automotive manufacturing practice impel outward uniformity and this striving after plate glass for windshields of the same thickness and color shades as closely matched as possible, is certain to bring about in time a demand for uniformity in the internal properties of this vitreous body so that its chemical and mechanical stability may be insured. Meanwhile it would be utter folly from a manufacturing point of view not to take advantage of whatever saving may accrue from the use of salvage and odds and ends for the smaller sizes of plate.

Automotive users of sheet glass for closed cars and other purposes experience relatively little trouble in securing uniform quality, producers of high-class sheet glass have succeeded in eliminating "stones," "seed," "blisters" and "string," resulting from want of homogeneity in the mass, the color of the sheets is uniform and, as far as outward appearance goes, these grades of sheet glass, which are made in thicknesses of up to 3/16 in., appear nearly as perfect as polished plate. In fact, some of this sheet glass is justly entitled to the designation of "blown plate glass." There is no denying the fact, however, that sheet glass is usually much weaker than plate and, where it is exposed to the strain of travel on rough ground, the hazard of breakage is certainly greater than in rolled glass.

Glass, to be ideal for automotive purposes, must obviously combine in the highest possible degree three qualities. It must aid vision, not obstruct it. It must withstand fracture as the result of sudden jolts and impacts. It must be reasonably proof against deteriorating atmospheric influences. This third quality is of special importance in regions where there is much rainfall and moisture and in tropical and semi-tropical climes.

Taking up for further consideration the first requisite, that of glass as an aid to vision, we naturally think first of the windshield and second of the glass in the rear of the car top. It goes without saying that in order to be serviceable for this purpose, glass must be free from all irregularities and blemishes that may result in optical distortion. Transparency, however, which is based on the homogeneity of the glass, i.e. a complete union of the substances that have entered into its composition, is at best relative. Even in the purest of optical glasses will be found a bluish or greenish tinge which interferes with absolutely perfect transparency.

The importance of the most exhaustive research into this phase of the glass problem, will be the better appreciated when it is recalled that by far the greater number of persons driving automobiles, suffer from more or less serious defects of vision. Without wanting to don the prophet's mantle, the writer would point out that the possible direction of progress in windshield manufacture may lie along the same lines as those which resulted in spectacle lenses from the researches of Crookes, who devised a series of colored glasses that protect the eye from the injurious effects of very short and very long light waves. It is interesting to note in this connection that these Crookes lenses are used very largely by workers in glass plants as a protection against the inroads upon their sight made by radiating, molten glass. For the present, however, the only safeguard of vision which can be provided in the windshield, is that the plate glass be free from all blemishes that may obstruct or distort the view.

The mechanical strength of glass is largely determined by the manner in which it has been cooled. Rapid cooling increases its hardness but makes it extremely brittle underneath the surface so that the slightest abrasion on the surface will cause the glass to crumble. The power of the glass to resist scratching is of the greatest importance in its use in the automotive industry, where it must be frequently cleaned and handled. The property of hardness is important as a means of preventing injury by scratching.

Generally speaking, glass rich in silica and lime is hard, while alkali, lead and barium make for softness. The expansive properties of glass are also of vital importance in its use in the automotive industry where it is framed in a metal rim. The problem of how glasses of various kinds will stand up under direct stresses, remains to be solved. Tensile and crushing strength have only been approximated and investigation of all those physical properties, knowledge of which is necessary as a preliminary to rational standardization for automotive practice, is very much of a virgin field.

Rain and sunshine affect glass. A speck of dust may be the opening wedge for decomposition. There are a number of tests to measure the durability of glass. The oldest of these is the hydrochloric acid test, the glass which it is desired to examine being immersed in a vessel containing this acid. Prospective durability is revealed after a few days by a rather bright surface, whereas lack of stability is disclosed if the surface appears dim and dull. Alkaline water decomposes glass by robbing it of its silica, the alkali and lime dissolving subsequently. Water rich in acids is less likely to be harmful to glass as the acids restrain the water from forming a union with the silica, thus shielding the alkaline constituents of the glass. The life of a windshield in a car stored in a damp garage is frequently shortened by the penetrating action of this moisture on the glass. The higher the alkali contents of glass, the greater the danger of deterioration by atmospheric influences and yet salt cake, i.e. sulphate of soda in which form alkali is introduced into glass, is indispensable to brilliancy of surface.

The rays of the sun alter the color of glass. The true nature of these changes is as yet unknown. Dr. Rosenhain ascribes the transformation to a transfer of oxygen from one to another of the oxides present in the glass. Translated into the practical, this knowledge that glass is vitally affected by heavy rain and intense sunshine, means that the automotive industry must find for cars that are to endure the hardship of tropical and humid climes, glass that will resist most efficiently the disintegrating elements.

The mirror, prescribed as indispensable car equipment by many states, also deserves consideration. The silver solution that gives it its power of reflection may cover the surface and yet be inadequate for durable, automotive use. The paint which protects the silver coating may be suitable enough for the temperate zone but absolutely inefficient for the climate of Zanzibar or Borneo. Nor has the subject of beveling ever been approached from a practical, technical point of view. Mirrors and plates are beveled to-day for two purposes. In the first place, beveling permits the rough and unsightly edges of the glass to be done away with and, in many instances, the inclosure of the glass in a suitable metal frame, the edges having been thinned for that purpose.

Then, again, beveled glass has come to be looked upon as an ornamental improvement over the plain. Inasmuch as a mirror in an automobile or motor truck, however, serves a highly practical purpose, it remains to be definitely settled whether a bevel over a certain width

does not interfere with the mirror's real job which is to reflect truthfully the objects moving behind the driver's back.

If the estimate is correct that the automotive industries have contracted for 40,000,000 square feet and are in the market for a still greater footage of the 1921 plate glass production (anticipated to be 100,000,000 square feet), it is high time that automotive engineers, designers and purchasing agents awaken to a full realization of what these figures mean from their respective points of view. From the engineer's standpoint, there should be clear recognition of the important duties exacted from glass, which not merely serves to keep out rain, cold and dust, but which shares with the car's internal mechanism responsibility for safety from accident, making or marring, so to speak, the driver's sight and controlling therefore the accuracy of his judgment while driving.

The designer will do well in appreciating the fact that glass, serving a practical purpose, should be used in sizes and qualities that will best further this purpose, the ornamental feature connected with the use of glass

to be subordinated, therefore, to the practical requirements. To the purchasing agent the magnitude of the plate glass consumption by the automotive industries will bring home the just claim the latter have on the producer who is thereby bound to adapt his product to the requirements of his best customers.

In point of technical research and standardization the plate glass industry, compared for instance with the domain of steel, is virgin territory. In the manufacture of optical glass tremendous difficulties have been overcome and invaluable improvements effected in the output as the result of the pressure brought to bear by trained men of technical science. The windshield and the auto mirror are as vital and of infinitely greater practical importance than the telescope which the astronomer uses to observe stellar bodies. Is it not then clearly up to the glass and automotive industries to join hands in an effort to wrest from the chemical and physical laboratory, from the furnace, the rolling mill, the polishing shop and the silvering room the ideal material for the automobile's optic nerve and then to standardize it so that it will stay "put?"

Recent Aeronautic Technical Reports

THE National Advisory Committee for Aeronautics has recently issued the following reports:

Report No. 79, Bomb Trajectories, by Edwin Bidwell Wilson.

Report No. 80, Stability of the Parachute and Helicopter, by H. Bateman.

Report No. 81, Comparison of United States and British Standard Pitot-Static Tubes, by A. F. Zahm and R. H. Smith.

Report No. 86, Properties of Special Types of Radiators, by S. R. Parsons, Bureau of Standards.

The Committee has also issued the following Technical

Notes (in mimeographed form and evidently for restricted circulation only):

No. 6, Static Testing and Proposed Standard Specifications, by E. P. Warner.

No. 7, Notes on the Design of Supercharged and Over-Dimensioned Aircraft Engines, by Schwager, translated from the Technische Berichte by George de Bothezat.

No. 8, Duralumin, by E. Unger and E. Schmidt, translated from Technische Berichte by Starr Truscott.

No. 9, Theory of Lifting Surfaces, Part I, by L. Prandtl, translated from the German and abstracted by W. Margoulis.

Building Roads with Tractors



This view shows how Monarch tracklayer tractors are used for road building in Alabama

Direct Selling in the Foreign Trade Field

This article is another of those written by Mr. Beecroft concerning the recent Foreign Trade Convention at San Francisco. It concerns one of the fundamental points of the export policy and should be considered by every firm that expects to embark to any extent into the foreign markets.

By David Beecroft

IN no case that I am familiar with, has foreign trade been established on a large and permanent scale abroad except through direct selling." This from William L. Saunders, president of the American Manufacturers' Export Association and chairman of the board of the Ingersoll-Rand Company, represents the consensus of opinion of the 500 representatives of American manufacturers who attended the recent seventh National Foreign Trade Council at San Francisco.

This subject of direct selling in foreign countries has been of such importance that for several years it has been the subject considered at a special session occupying an entire afternoon. The delegates are from one hundred or more industries and invariably the general conclusion is that the American manufacturer can not afford to go into foreign trade unless on a broad permanent scale, and that this can not be accomplished except by direct selling.

By direct selling is primarily meant having your own branch, a policy that has been established by the pioneer American makers in many lines who now have a world wide business and who have been the bulwark of the good name of America abroad. This policy is being gradually adopted by motor car concerns, the Ford organization being a leader in this work.

Direct selling in the foreign field is looked upon as imperative, if a permanent business is to be built up, for many reasons. Mr. Saunders believes that it is cheaper than any other form of selling and many delegates at San Francisco agreed with him in that opinion. With the agency, the larger the volume of merchandise handled the larger the discount that must be given and the smaller the profit to the maker. There is a psychological reason in favor of the branch, namely, in that the dealer or sub-dealer and consumer feels he is getting better prices and terms when dealing with a branch as compared with dealing with a distributor.

An advantage of the branch as compared with the agent is that the branch is in a position to take advantage of price fluctuations, raising the price when the market rises or dropping when selling conditions demand, whereas, with agency representatives, the home organization has no opportunity of taking advantage of such. The invariable problem of a change in dealership leaving the maker without any hold on the market is always a strong factor to be considered.

Direct selling does not mean carrying on retail sales in any foreign country from a branch. There may be many agencies established by the branch. The branch may not carry all the stock, but the home representation centers in the branch. This develops closer contact between the maker and the buyer. A mutuality of sympathy and interest is created. It enables the maker of the product more nearly to meet competitive conditions. It shows him how more nearly to meet the fancies of his customers. The maker gets closer to the foreign market.

The major point driven home by the many delegates who participated in the discussion was that to study any foreign field, you must not send a hireling merely because he speaks the particular language of that country, but rather send the best man in your organization. The president

or general manager is none too good. Time and money spent by careful investigation is well spent—and every dollar so expended often brings results a hundredfold. The home manager can even make an investigation in China or Japan in ninety days. On such a trip, he sees the possibility of business through the eyes of his company. No hireling could do this.

When selecting the men to look after your trade in foreign fields, if possible, select unmarried men. It is generally very difficult to rear families under foreign conditions. Frequent changes in your foreign representation is a serious error. Changes in your domestic organization can be made much more readily and with less

CLOSE contact between principal and agent always makes for the best results; there is created a mutual bond of interest. All trade to be permanent and profitable must contain the elements of mutuality of interests. Direct selling promotes this; it is like seeing a man yourself and talking things over with him rather than writing letters or sending some one else to talk to him and represent your case.

Direct selling through advertising alone cannot fully meet the situation. It does some good in certain lines which are simple, or of a common or standard nature; but it is at best unsatisfactory and of temporary value. All buyers in all countries like to place orders with some one who is on the spot. In machinery trades this is of the greatest value. The buyer feels that there is some one nearby to take care of the product, to see that it performs properly and to aid in overcoming difficulties and in repairing trouble.

interruption than changes in your foreign personnel.

To hold our foreign trade now that the war is over is a major problem. It may demand very strong representation and, if the permanency of foreign trade is desired, no limit can be placed on the representation we have in the foreign field.

Mr. Saunders summed up his observations as follows:

"Just as a straight line is the shortest distance between two points, so is direct selling the shortest and surest way to sell goods. This axiom applies as well to domestic as to foreign trade. Manufacturers at home have the means to reach customers by direct methods,—they know the country, the ways of doing business and the facilities for financing orders, hence domestic trade attracts first attention and returns come in in large volume.

Not so with foreign trade. With the exception of a few of the larger manufacturers, there has been little determined and fruitful effort to reach foreign fields. Every one has at all times been willing to give special discounts to agents for foreign trade, to send catalogs, to advertise, and even to share the expense with others in sending a traveling man abroad; but this only approaches the situation; it is merely a process which sometimes enables one to get rid of a surplus stock at a sacrifice; but it does not, and can not, establish those relations which are a necessary precedent to a permanent and enlarging business. Such methods are amateurish and not professional. We all practise them in the beginning. When we get wise through experience, we turn to direct selling.

"In the early days, the Ingersoll-Rand Company was represented by agents at home and abroad. In domestic work many of those agents were of long standing, they were looked upon almost as a part of the company. The business had been profitable for all concerned. But it became apparent that in territories where direct selling was resorted to, both through traveling salesmen and by establishing branch offices, the proportion of business ob-

tained was much greater than even with the best agents.

"This resulted in the adoption of a branch office policy in all new fields and the gradual replacement of agencies. In some cases we located a man and sometimes an office force under the same roof with the agent, co-operating with him by giving a more direct contact to the agent. This policy usually brought larger sales and more profit to both principal and agent. In some cases the agent was taken over, placed on the payroll and brought at frequent intervals to the home office and the works for education and closer contact. In time he became a branch manager. In other cases the branch gradually absorbed or replaced the agent entirely. In others, they both did and have continued to do business in the same office side by side, to the satisfaction and profit of both.

"If this process is good business at home, how much more necessary it is to follow it in developing foreign fields. It seems to me to be altogether a question whether or not we are in a position to finance a project looking to the extension of one's business on a permanent scale. All experience points to the conclusion that if we have a product of value, something which is, or which might be, used in a foreign locality, and if there is a fair chance to sell it at a price not too much above that of the native product, we should send one of our best men first to look over the ground and then to open an office there.

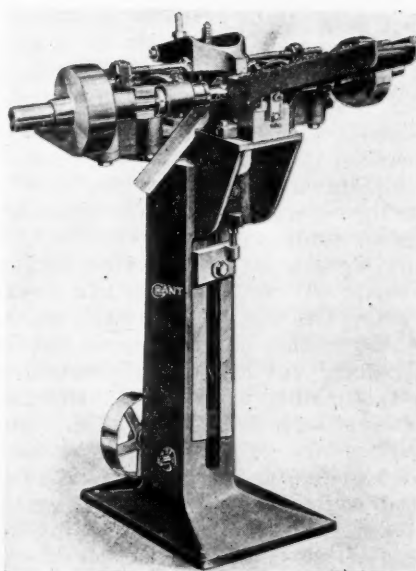
"He was doing a good business and the manufacturer at home was well satisfied. This agent retired from business. An American youth, who was only a sales clerk in his office, was made manager, and he doubled the business the first year.

"All foreign connections are not the same in their methods of doing business, hence there is no rule of three that can be set down as applicable to all of them. In some it pays to talk American goods, for there is a charm about the name; in others to say that the goods were made in America is of no selling value. A good man on the ground will learn how to steer in these things."

Machine for Chamfering Piston Pin Ends

THE rapid handling of small pieces of work requiring an operation at each end is one of the problems of production. A machine designed to simultaneously chamfer both ends of pieces similar in size to automobile piston pins is manufactured by the Grant Mfg. & Machine Co. It is claimed to turn out forty pieces per minute. It can be used to drill, counterbore, etc., both ends of either round, square or irregularly shaped pieces.

The pins, after being cut off from the bar or tube, are placed in the hopper of the machine, which may be seen in the illustration. From the hopper the pins roll or slide down the incline to the feeding mechanism, where they are taken by a slide, one at a time, and placed in the proper position to be clamped, while the cutters come in from each end and do the chamfering. The cutters then recede,



Grant double ended chamfering and drilling machine

the clamp is released, and the feeding slide, which already has another pin in position, pushes it forward and at the same time ejects the finished pin, which comes down the diagonal slide shown at the left of the machine table.

Low Fuel Consumption Test on Austrian Daimler

A BELGIAN publication, *L'Automobile*, reports a test made on an Austrian Daimler car with four-cylinder 3.54 x 5.52 in. engine, in which the fuel consumption figured out to one U. S. gallon per 28 miles (13.5 liters for 100 kilometers). The maximum speed attained was 56.6 m.p.h. The chassis alone weighs about 2200 lb., but the weight of the complete car with the load it carried in the test is not given. It must have been about 3000 lb.

Bringing the Worker's Skill Into Play to Increase Production

The intelligence and initiative of the worker are vital forces in raising plant and factory output. By recognizing these qualities and by harnessing them for use, the management may bring about upturns in its production curves, but only by placing responsibilities on the worker.

By Harry Tipper

SOME time ago in considering the question of the improvement of production per man per hour by the use of improved methods, the writer stated that a good many of these improvements would only be secured by harnessing the intelligence and initiative of the worker so that he would become interested in studying and suggesting possibilities in the development of his own work.

In several of the cases which have come to the writer's attention, where the workers have been taken into the confidence of the management in respect of the work, the policy of the company in regard to its production and the common objects before them, the result in the actual improvement of production methods has been somewhat amazing. In one or two cases the workers have succeeded in designing new machinery capable of producing more rapidly and with greater ease. In other cases they have been able to improve the jigs so as to permit a better production schedule on their own work and in a number of cases the quality has been improved at the same time. These articles have many times pointed out the enormous amount of potential power for production improvement, which lies unused through the lack of incentive on the part of the worker to exercise any of this power.

Instances have been quoted showing the largely increased percentage of production efficiency which could be secured under such circumstances and some reference has been made to the improvement of the production method. This latter point, however, has not been emphasized because the number of experiments have been insufficient to form a basis for adequate conclusion.

It is obvious that there is intelligence in the ranks of the workers and a large amount of intelligence which is not required for the repetitive work demanded in operating the machine. It is obvious that this intelligence cannot be awakened to exercise itself upon the object unless the circumstances provide an incentive to study and an encouragement to improvement. While these things are obvious, however, the experiments conducted with these objects in view have not affected many establishments and have received little attention. They cannot be regarded as conclusive, but they can be pointed out as indicative of the possibilities which lie in this method of attack and the practical effect of establishing such incentives.

In one case in a power plant, the improvements, suggested, carried out and developed by the engineer in charge and his assistants, resulted in the reduction of the coal bill by 50 per cent and the elimination of one-third the boiler capacity necessary to provide the steam. In the case of a small machine shop in the heavy metal trades, the revised jigs and fixtures for certain classes of work

resulted in the increase of production almost 50 per cent over the previous capacity. In the case of the paper pulp mill, which we cited a week or two ago, the result was a uniform paper with a much higher average price and an increased capacity sufficient to permit an increased payroll and at the same time to bring an increased dividend to the stockholders.

How are these things accomplished? In one of these cases, the organization had been changed to include a full development of the House and Senate plan as suggested by Mr. Lietch. In another case there is a Works Council or Conference and in the third case no formal machinery was employed except the regular union machinery in the shop. It is evident that the actual method of development has had little influence on the result as these methods of organization vary very widely and are entirely different in their technical development.

In all three, however, there is evidently an endeavor to establish three items which are the basis of the success. The first is a just policy of agreement with the worker. The second is a wise policy of education so that the common necessities are understood and, the third, a reward shared by the worker, with the company, for improved production. These are common to all the different systems which have been successful in harnessing the worker's initiative and intelligence, and which have resulted in a greatly improved production capacity and method therefrom.

The establishment of a just policy, which means, of course, a policy of agreement with the worker and not a policy of instruction to him only, gives that worker the sense of security without which he cannot begin to put his intelligence and initiative into the work.

The second item—that of education as to the common objects and necessities—gives the worker a basis of knowledge upon which to start his study and his attempts at developing the character of his work. The third plank in this platform provides him with a reward which is automatically affected by the character and results of his own effort. This visual effect provides the evidence of the justice and the value of the education, justifies the worker in his belief in the security of his work and the squareness of his employer, and identifies him in the company by permitting him to share in the results of his own production effort.

We have had a good many systems employed by engineers and production managers which have sought to pay the man for the results of his production effort and have

had their effect upon the production efficiency. To pay him what he knows he has earned, keeps the man earning at a reasonable percentage of his capacity, but it does not necessarily give him any incentive to harness his initiative and intelligence in the development of his work. As between shops which used piece-work systems with bonuses, properly regulated time studies and fair rewards, there is no reason in these systems themselves for the individual allegiance of the worker to one particular establishment. None of these things are capable of suggesting to him any valid reason why he should improve the production conditions of his work or trouble himself as to the validity of the production methods.

The mere reward for work accomplished does not in itself suggest that the man is a part of the company and that he is in the game with the company, with his responsibility of working out his share of the problems of production. The establishment of a square cut policy of agreement with the workers so they are aware that confidence is placed in them and that they are expected to bear their share of the burden of responsibility for the continuance of such agreement, plus the necessary education upon the common necessities and common problems, is vital to any scheme which has for its object interesting the worker in the improvement of the production methods and harnessing his intelligence for the development of the establishment.

Many manufacturers are afraid to meet with their workers on matters of this kind, which seem more or less theoretical and intangible and which are not subject to the same concrete application as the matter of wages and similar subjects. I believe this fear would pass away if the manufacturers realized how much intelligence there is of a potential character among the skilled workers, which could be harnessed and devoted to the improvement of production.

The whole history of the last twenty-five years is a history of development based upon the ability to harness the combined intelligence of numbers of men to the solution of the same general problems. There are many things about

industrial operations that no engineer, no foreman and no production manager can visualize clearly enough to be able to suggest any improvements. In many cases the worker knows far more about the little deficiencies in the present systems of operations and the way they can be solved than any other party to the problem.

Doctors tell me that the best nurses know much more about the intimate detail of treatment of many diseases or slow ailments than the doctors themselves, because they stay with the case and are more intimate with its minute changes and necessities. It is much the same in industry. The intelligence of the efficiency engineer, inspector, the production manager and the various supervisors is necessary to the working out of the practical problem. But there are many matters upon which the workman knows better and in regard to which he can suggest better methods of improvement, if he is treated in such a way that his initiative and judgment are harnessed by incentive to the job.

This question of providing incentive is not merely a question of inducing the man to stay at his work or to put his back into the work, it is the question of opening the potential intellectual power of the skilled workers and applying it to the jobs, about which they know more than anybody else. In a few cases where unusually wise engineers and production men have been able to do this, the results have been amazing and in some cases almost unbelievable.

No man who knows skilled workers intimately would question their possession of intelligence and shrewd judgment. No man would question their intimate knowledge of the details of their work. These two harnessed together for the benefit of production method would give back to the manufacturer so much more than he gives in his definition of a just policy and agreement, of his educational development of the common necessities, and his reward for the effects, that it would change the whole surface of skilled industry. Herein lies the great opportunity for the practical development of production in the near future, and it will be a wise manufacturer who takes counsel how to develop matters along these lines.

Annual Meeting of the German Automobile Manufacturers Association

THE nineteenth annual meeting of the German Automobile Manufacturers' Association was held in Berlin on May 7 and was attended by representatives of all the German automobile factories and of some parts factories.

Considerable attention was given to the organization of the Steel Economic Union and the price politics of the steel industry. It was urged that the Steel Economic Union should take steps to get the steel industry to pay more heed to the desires of consumers. Representatives of the Union of Alloy Steel Manufacturers present promised to do their utmost in this respect.

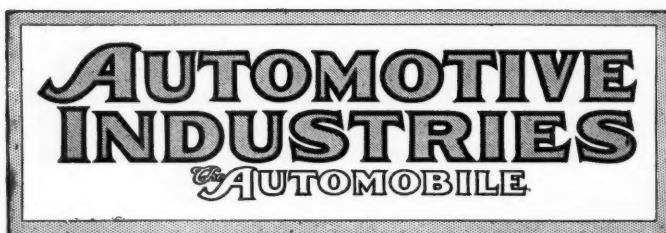
It was mentioned that negotiations had been opened with the Austrian automobile industry in regard to closer cooperation in economic matters. Another subject discussed was the proposed luxury tax on automobiles and, after discussion, a resolution was unanimously adopted requesting the Government to free automobile traffic as soon as possible, as under the present restrictions not only did the industry suffer in its sales possibilities but all transportation, which is the foundation of the country's economic life, suffered. A special protest was directed against the bothersome restrictions on automobile traffic by sub-

ordinate government departments. It was decided to draft a petition to the Government in this connection and to co-operate with the large automobile clubs in the matter.

After having reached an agreement with the Standards Committee of the German Industry, the association concluded its standardization work up to a certain point but, unfortunately, the standards formulated were not yet legalized. It was stated that the whole industry was very much interested in seeing the National Assembly, to which the question of standardization had been referred, pass the legislation necessary to make the standards decided upon legal.

The association also adopted a protest against the export duty, which, according to it, was decided upon at the most unfavorable moment when, in consequence of the rising quotation of the mark, the prices at which German firms were able to deliver in foreign countries were not only equal to but in some cases higher than the prices prevailing in those markets.

It was decided that in view of its increased activities, the association should acquire its own home, and the new quarters will be moved into in the course of a year.



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Automotive Industries—The Automobile is a consolidation of The Automobile (monthly) and the Motor Review (weekly), May, 1902, Dealer and Repairman (monthly), October, 1903, and the Automobile Magazine (monthly), July, 1907, and The Horseless Age (semi-monthly) May, 1918.

Mail Service and Business

THE following sentence is a quotation from a letter just received by AUTOMOTIVE INDUSTRIES:

"It is unfortunate that there should be any delay, but we find this is rather a common occurrence these days."

The writer was referring to a package that he had mailed several days previously. He asks that several days be allowed to elapse before reporting finally. Such occurrences as these are the basis of frequent complaints concerning the mail service.

In this connection an interview with J. C. Koons, First Assistant Postmaster General, received in the same mail, is of great interest. Mr. Koons refers to the Postoffice Department as a business institution which transacts a business of \$450,000,000 annually and he shows that the business this year is running about 33 1/3 per cent heavier than a year ago, also that in the face of this increase, the mail equipment is becoming alarmingly inadequate. He sets forth in this interview the need for business buildings for

postoffice purposes in New York. He says that the need is not for monumental buildings, but for modern ten-story buildings, in which incoming mail can be raised to the top floor and sorted and otherwise handled as it descends by gravity. What he recommends for New York is equally applicable to every large city and such recommendations should appeal to every business man.

The obvious step for business is to get behind a proper program for the postoffice department and to see that Congress provides for such a program. The mails are of vital importance to business. It makes no difference where the business is, that business must have good mail service to function to the best advantage. Efficient mail service cannot be maintained without modern equipment, so if business can influence Congress to grant the postoffice efficient equipment, and plenty of it, the duty of business is obvious. It is a pleasure to think that, whatever the conditions, the postoffice has never declared an embargo.

The Sulphur and Phosphorus Content of Steel

THERE is a general impression in the automobile trade and among users that the steel which has been used in automobiles during the past few years is not of equal quality as that used prior to 1915. During the war, owing to the priority system in vogue, automobile manufacturers were often compelled to take what steel they could get and use it instead of the steel their original specifications called for, but these restrictions on the steel market have, of course, long since disappeared. There is, however, still considerable trouble in some instances, and engineers are inclined to ascribe it to the higher sulphur and phosphorous limits which are now allowed by the S. A. E. specifications. Prior to June, 1914, the sulphur limit was 0.045 per cent in most of the S. A. E. specifications, and the phosphorous limit 0.04 per cent, but at that meeting it was voted to increase the limits of these impurities to 0.05 and 0.045 per cent respectively.

There was no delusion among automotive engineers that this change in the specifications would but result in a slight deterioration in quality, notwithstanding assurances from steel men that sulphur in amounts even much greater than allowed by the specification had no deleterious effect. But the conditions seemed to compel the change. These impurities are introduced into the steel for the most part by the fuel, and the fuel shortage of the past several years has necessitated the use of very much poorer grades than were obtainable previous to the war. On the other hand, the demand for high grade steel has greatly increased.

It is not only in relation to the fuel necessary for refining steel, but also with regard to the ores from which the steels are made that conditions have changed for the worse. Naturally, the richest ores and the best fuel deposits were worked first, and as time goes on we are compelled to work the lower grade deposits. The situation which made it necessary to raise the limits on phosphorous and sulphur,

therefore, was not of a temporary character, due to the war, as may have been imagined by some, but is more likely to become aggravated than relieved in the future. The chances of a return to the old specifications are therefore very small.

Trade Organizations

RECENTLY a young man who is representing a manufacturer of an important item in the automotive trade in New York received an order to select the three most important trade organizations in the city and to join them either as an individual or for the firm, as the circumstances might demand.

It might be said here that the young man immediately carried out the order in the full spirit in which it was given, and that he came to The Class Journal office to verify his selection as to organizations. But the point we wish to make is that this order was considered in many sources as quite out of the ordinary. It would appear surprising that such is the case, for certainly all manufacturers must realize the great work that has been accomplished by trade organizations and the still greater field for organized effort that lies before them.

It might be well for manufacturers to make a personal application of this and inquire if their branch representatives belong to the beneficial trade organizations.

Foreign Trade Outlets

UP to the first of this year, many of our manufacturers were burdened with numerous unfilled orders, which they could not fill, even though their plants were running to capacity. Since that time, however, business conditions have changed and the general slackening in buying throughout the entire country has enabled automotive manufacturers to take care of previous orders and many of them have accumulated surplus stocks.

This unsatisfactory condition has not prevailed for several years and, while it was entirely unexpected by many, yet the alert and far-seeing manufacturers have been perfecting their plans for over a year to take care of their output in just such an emergency.

The American manufacturer who has been carrying his eggs in one basket, depending entirely on domestic trade to keep his plant running, is in a trying predicament. With no real encouragement as to a satisfactory change of the present unhealthy situation, he is compelled to choose between two alternatives: go into the foreign markets and dispose of his unsold output, or reduce his working force to the minimum to prevent a steady accumulation of stock.

There is, and always will be, a large demand for the American-made vehicle abroad. Owing to the rate of foreign exchange in Continental Europe (which more or less affects Australia and the Far East) our American manufacturers are turning to Latin America as their most logical field of operation. From a nation that stood far down in the list of exports in Latin America, the United States now stands first in many commodities.

In this connection the importance of being fully sold on the necessity of foreign trade should be emphasized. If the manufacturer is not entirely satisfied that he wants or needs export business, it is far better for the good of all manufacturers concerned that he confine his efforts to our own country.

If, however, he is aggressive enough to fortify and protect himself against possible adverse conditions arising in the near or distant future, then by all means he should go after foreign trade. Get established abroad with an efficient foreign sales organization and the manufacturer will never have any occasion to worry about any slump that may occur here in any one market.

Automotive Prospects in Cuba

EXPANSION of American trade with Cuba in automotive products has been predicted by Director Roy S. MacElwee of the United States Bureau of Foreign and Domestic Commerce, who recently returned to Washington after an inquiry into commercial relations with the neighboring republic. Because of the unusual prosperity of the Cuban people, there has been a heavy demand for motor vehicles. The Government official believes that Americans could establish and maintain profitable sales agencies, especially where repair shops are installed.

Director MacElwee declared that the Cubans have manifested quickened interest in motor transportation since the price of sugar products advanced. Extravagance continues to grow until the authorities are at a loss as to methods to curb the heavy expenditures. Any type of motor vehicle capable of operation brings fabulous prices, principally because port congestion prohibits prompt delivery of new cars.

"Havana would be broken down to-day from a transportation standpoint, if it were not for the large number of American cars which are in constant use," the Director stated. "The one-way streets in the old city proper are extremely narrow. Thus, we find that the small passengers cars are, at present, ruling favorites. Expensive makes, especially cars having elaborately designed bodies, have been growing in popularity as the wealth of the citizens increased. A few German cars will yet be found. English manufacturers have little or no market in Havana.

"The development of the new suburb Veado has created a heavy demand for automobiles. Garage space is at a premium. Repair shops are hopelessly inadequate in numbers. The natives, flushed with money, insist upon remaking the bodies, particularly changing the design of the hoods."

According to the Federal official, the highways of Cuba have not kept pace with the development of the automobile trade. It is a popular custom for the people to pay five cents for a seat at a plaza near Morro Castle, where a perpetual automobile show is in progress. The thoroughfare is the only good road and an endless stream of motor vehicles passes in review.

Progressive planters have pressed motor trucks into service to bring their products to the markets. Heavy trucks have been much in demand for short-hauls in the provinces. Light trucks are used principally in the cities.

Director MacElwee declared that the cost of living in Havana would prohibit the Department of Commerce from maintaining a trade commissioner there. He believes that an improvement in port conditions would stimulate a demand for American automotive products.

Need of Job Makes Labor Speed Up

Efficiency Greater as Trade Slackens

Trend Toward Greater Production Per Man Noted in Industrial Centers—Turnover Drops

NEW YORK, Aug. 24—Curtailed production and the laying off of many men is bringing increased efficiency of labor in the factories of the country, according to reports from executives. This applies as much to the automotive industry as any other, according to information gathered by correspondents of AUTOMOTIVE INDUSTRIES in production centers.

The reports show somewhat spotty conditions, but the general trend is toward a greater output per man per day. The spectre of possible unemployment has had a wholesome effect upon the attitude of the workers and they are more concerned than they have been for years over the possibility of losing their jobs. The psychological effect has been gratifying, also, for employees seem to be more contented with the jobs they have. At any rate, they have ceased to go from one factory to another seeking a few cents more an hour.

An attitude of greater moderation has been assumed by labor unions and their membership. There is less talk of strike and more of mediation when there are grievances. One of the most striking cases is that of an automobile company in Cleveland which decided to retrench by reducing its working force 25 per cent. Instead of the expected slump in production, output soon climbed above the level which had prevailed previously. Many other companies report that production costs have been cut by the larger amount of work produced per man.

While the change is highly gratifying to the industry, it has been more or less automatic and as it stands now gives little indication of being permanent. Industrial conditions have made it necessary for manufacturers to cut their staffs and with winter coming on the workers are not inclined to risk their jobs by indifferent work. It is doubtful if the relations between capital and labor are any more friendly basically.

Inefficients Retire for Less Exact Work

CHICAGO, Aug. 23—Of the managers of the four largest automobile manufacturing companies in this vicinity, one strongly emphasized the increasing efficiency of the factory employees since they were faced with the possibility of unemployment; one found that the prospect

of unemployment is affecting the efficiency of the men to some extent, and two stated that no effect could be seen either on the work or workmanship of the employees.

The first mentioned said that the greater efficiency was "automatic" with talk of unemployment and found that under the changed conditions the foreman was beginning to regain to an appreciable degree his former powers of direction in the factory where more or less increased efficiency has been noted. A slight labor turnover has been the result of the talk, inefficient workmen choosing to retire of their own accord and seek jobs elsewhere before the men who have been laid off in other factories have taken all available places in factories working full time period.

Weeding Out Leaves Better Class Workers

INDIANAPOLIS, Aug. 23—General impression around Indianapolis automobile plants is that men are working just a bit harder to hold their jobs since possibility of unemployment has arisen. Inefficient workers have been weeded out and those left take their work more seriously, although the time has been too short to prove this conclusively. Foremen at Premier plant say this is undoubtedly true. Otto Molleril, labor superintendent at the National plant, says tendency is toward harder work, although National force has been back at work only two days following partial shutdown of two weeks and it is impossible to determine extent of degree of tendency. H. C. S. officials have noticed that more men and a better class are applying for positions. Leonard V. Bedell, in charge of labor at Stutz factory, has noticed no change as yet. Stutz is working three-fifths usual force in certain departments and getting exactly three-fifths usual production. Cole reports that men are anxious to hold their jobs and are working accordingly. Marmon reports there is a general air of more earnest work at their plant, although unable to give definite proof.

Quit Days of Rest in Syracuse Plants

SYRACUSE, N. Y., Aug. 23—Prospects of unemployment have caused men working in Syracuse automobile factories to pay much closer attention to their work, according to the statement made to-day by H. Winfield Chapin, general manager of the Brown-Lipe-Chapin Co., manufacturers of transmissions and employers of more than 4000 men. Chapin said:

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No More Shopping at Detroit Plants

Discontent and Dissatisfaction of Rush Period Evaporate as Dull Winter Signs Appear

DETROIT, Aug. 23—While there is no surplus of labor in Detroit, automobile factories report a strong inclination on the part of employees to hit the ball and stick tight to their jobs, apparently guided by the slowup in the industry and the consequent fear of unemployment. Employment managers say the men have quit "shopping" and are "sitting tight" six days a week with an increase in productive effort, ranging from 25 to 50 per cent in different factories.

Peculiar condition at Packard is that there are fewer men applying for work throughout a full week than was customary in one day during the period of abnormal production. The only reason assigned is the possibility that a report was circulated that Packard was not hiring or that all employees are glad to hold the jobs they have and not float around looking for a few cents more.

Ford reports that the dissatisfaction and discontent apparent last winter and spring is past, men are satisfied and apparently glad to hold their jobs. Hupp is still hiring men and report their old employees are giving 50 per cent better work. Similar conditions exist at Dodge, every man apparently taking no chance with his position and giving somewhere near 100 per cent efficiency. Employers association reports for the last week show greater hiring than lay-off in the total of two hundred thousand men employed by its members. Reports of depression, slump in demand and production curtailment with reduction in work forces in some instances, have brought visions of a long hard winter and the men now at work are evincing a determination to stick.

OVERLAND KEEPS UP OUTPUT

TOLEDO, Aug. 23—Increasing efficiency noted with Overland workers. The plant is working five full days a week. The reduced force of about 10,000 is productive of nearly the same amount of cars, 500 a week, as full working capacity. Seventy-five per cent of the workers are on piece rates and there is no decrease in these rates. The materials are gradually accumulated before workers and they show more anxiety to work harder. There is greater interest by workers in problems of car production and distribution. They realize lack of transportation is not the only cause of layoff.

Trade Conditions Take Better Turn

Railroads Improve, Crop Credits Better

Slowing of Production Clearing Traffic Congestion—Manufacturers Convert Inventories

NEW YORK, Aug. 23—Unmistakable evidences of growing confidence in the stability of the financial structure have become apparent within the past few days. The change to a more optimistic tone was noted in AUTOMOTIVE INDUSTRIES last week and the trend has been more strongly in that direction every day. One of the chief reasons for the heartening outlook is marked improvement in transportation. Another is assurance by mid-west bankers that they will be able to meet the peak of crop moving credit demands without a serious strain upon their resources and those of other districts.

The unparalleled freight congestion of the last four months which turned the hair of many manufacturers prematurely gray and wrecked more than one company, is being untangled. The material bettering of the situation has come about with surprising rapidity since increased rates were granted the carriers by the Interstate Commerce Commission. Those who predicted that there would be just such a development are wagging their heads wisely.

Whatever the real reason for the improvement, however, it has permitted shippers to take a long breath for the first time in weeks. They can load freight now with some assurance that it eventually will get to its destination. It should not be forgotten, however, that one of the chief aids in relieving congestion has been a sharp curtailment of production. The flood of freight which engulfed the carriers has been dammed by short time operations or the closing of factories.

Loan Demands Smaller

Slowing up of production also has been responsible in considerable measure for the easing of the credit strain. The volume of loans sought on commercial paper is growing steadily smaller. Plants are reducing their inventories and curtailing expansion plans. This is as true generally in the automobile industry as in any other line except textiles, boots and shoes.

Automobile plants in the Detroit, Indianapolis, Cleveland, Toledo, Syracuse and other districts are laying off men in considerable numbers or operating on a four or five day week basis. In almost every instance this is due to decreased demand. There still are transportation difficulties but they do not constitute the

Banker Sees Need for Common Sense

By C. Q. CHANDLER

Chairman of the Board, First National Bank, Wichita, Kan.

Bankers must meet the proposition of loans in the automobile industry in a common sense way and learn the value of saying "yes" as well as "no."

It is regrettable that the motor people themselves have pushed the passenger car as much as they have in proportion to the truck and tractor. While there is a legitimate place for the passenger car, and I do not underestimate this, yet the motor truck and tractor are already, and will become more and more, a great factor in commerce.

In driving from my home in Wichita, Kan., to Kansas City two weeks ago, I counted the motor trucks. There were sixty on the road which were loaded with all kinds of freight, household goods, creamery products and building materials. The practical use of the motor truck thus demonstrated conclusively. Not only will the motor truck be an assistance in transportation, but it is going to greatly improve the farm service.

We are confronted to-day with two great problems, transportation and the lack of production on the farms. The motor truck will help solve both of these problems and the tractor will be a great factor on the farm, both because it will increase production and because it will help the farmer in regard to the labor proposition, and for these reasons I think bankers should be careful in their discriminations as regards the whole motor proposition. To properly encourage the use of motors and tractors and the financing of them, will be a very proper thing for bankers to do.

impelling factor in curtailing operations. Tire factories and parts plants are of necessity following the lead of passenger car and truck makers in this direction. Financial statements for the year up to the end of June and July generally show gratifying earnings but the pace set will not be maintained for the last quarters.

Every manufacturer in the industry, if he is wise, is making every effort to cut down the amount of money tied up in inventories and get cash into the bank. Short cash reserves and large sums tied

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Luxury Cars Few Statistics Show

Gain of 3,000,000 Man Power Through Automobiles Demonstrated by N. A. C. C.

NEW YORK, Aug. 23—Any last, lingering doubt about the passenger automobile being an essential vehicle is banished by facts and figures gathered by the National Automobile Chamber of Commerce. The conclusions reached are based upon the replies to a questionnaire sent to 10,000 motor car owners. These replies prove that 60 per cent of the automobile mileage is commercial and that the cars have added 57 per cent to business efficiency. Rural productivity has increased 68 per cent through the use of automobiles. Of the farmer car mileage, 78 per cent is for business purposes. Living conditions of 37 per cent of all the car owners questioned have been improved by the automobile and 90 per cent of all the cars are used more or less for business. Thirty-four per cent of the average mileage is instead of trolley or railroad or where there is no other means of communication.

The questionnaire went to automobile license holders taken at random from the registration lists of California, Iowa, Massachusetts, Minnesota, Nebraska, New York, Ohio, Texas, Virginia and Wyoming. If the average of increased efficiency which was reported were continued through the entire list of motor car owners, it would mean a net gain to industry of 3,000,000 men. Farmers owning cars number 2,367,000 and the reported 68 per cent increase in production, equivalent to 1,600,000 hired men.

Helps Housing Problem

Another striking fact disclosed is that the automobile has been an important aid in the solving of the difficult housing problem. According to the facts shown by the questionnaire, 37 per cent of the country's car owners, or 2,300,000 families, are finding it possible to live in the suburbs because of the motor car. Nearly two-thirds of the owners reported that they traveled in their motors instead of by railroad or electric lines.

The passenger car has brought increased efficiency in every walk of life, but farmers are the heaviest users, with physicians and salesmen next in line. Contractors, real estate dealers and insurance men find automobiles especially useful.

Forty per cent of the bankers who replied to the question card find the car a help in their business. A Minnesota banker reports that the car has multiplied his business efficiency "ten times."

Ford Cut Upsets British Motor Trade

Reduction to Meet New Horsepower Tax Provokes Pessimism in Domestic Makers

LONDON, Aug. 6 (*Special Correspondence*)—Not for the first time has Henry Ford sprung a surprise on the British motor trade. His latest takes the form of a concession more than equivalent to cover the cost of the new \$5 per hp. rating. Virtually the new—or to be precise—the second reduction amounts to \$125 off the car and \$250 off the truck, taking the pound sterling at pre-war value.

A fortnight had intervened since the Ford interests at Manchester promulgated a reduction of price of their chassis, car and truck, when a further cut was announced, the effect of which was to bring the prices back to their position at the end of last year. The stunt press having a short memory overlooked this last fact, and treated the latest reduction as something more important than it really is.

The stunt is now being pursued for sensational "copy" in the form of interviews in likely motor trade circles, with the result that in some quarters pessimism is expressed—which probably only wanted voicing, and in a few others the parties affect not to be interested. To understand the situation it may be well to note briefly the following points:

Large orders for British and European cars remain unfilled, chiefly because of delayed materials and a shortage of necessary staff.

Cars not delivered or in sight by Aug. 1 are not likely to be wanted unless by doctors and others who use a car primarily for their work.

Numbers of people "fed up" with the delays and broken promises are just the mark for the Ford reduction to work upon. They attach more importance to it than is intrinsically justified.

Many Non-Delivery Suits

Another set of disappointed people are anxious to get their own back by taking "the law" for non-delivery, broken contracts, etc., against dealers. Cases of this sort are coming before the courts and invariably the dealers lose the case, and have heavy damages recorded against them. Naturally they are anxious as to their position with the manufacturers. Can they be made to pay up?

The manufacturers charge the dealers with too easily repudiating their agreements as to the number of cars and trucks booked for delivery, urging that dealers plead inability to accept delivery from lack of buyers, which places the manufacturers in the position of either suing the dealer for voiding their contracts, or insisting on sending along the goods, hazarding their sale or return in the likely event of the dealer having to close down.

Therefore, with the tempers of the dealers and the public and the manufacturers in its present disturbed state, it is possible that the Ford price cut will have more effect than really belongs to it.

One effect likely to follow will be to test the possibility of a cut in other cars, especially those in the more competitive price categories. Studebakers, Overlands, Dodge and other imported cars are necessarily about 50 to 60 per cent higher here than in the States, so that for the time being they are competing against normally medium priced British and other European cars.

Other Americans May Follow

If American headquarters decide to follow Ford's lead then a difficult problem will confront the British makers, since there has been a steady increase of price of British cars, and it has been sought to justify each on the increased cost of manufacture. If these makers cut their prices what becomes of this plea? On the other hand, if they don't, what of the position of their dealers still waiting for cars?

Another aspect of the situation is seen in the following remarks from a Sheffield paper—Sheffield being the seat of the motor vehicle steel industry:

"The reactionary movement in the important motor industry is causing some anxiety in Sheffield, as the builders of all descriptions draw heavily on our steel trade for material, much of it being of an expensive kind. *Not only have orders from this source fallen off lately, but motor trade accounts are getting more and more into arrears.* Not much improvement is expected until the industry is placed on a sounder and healthier basis."

This reference to trade accounts is cryptic; it may refer to manufacturers not accepting supplies when tendered, or to overdue payment of accounts. Apparently the latter alternative is intended as may be gathered from the next sentence.

Production Costs Lower

DETROIT, Aug. 23—Ford officials say prices have been reduced in England, but think it due to decreased cost of production rather than the new horsepower tax. The English company is a separate organization and the local company is simply a stockholder, though probably controlling a majority of the stock. Officials say the American company has nothing to do with prices or policies in England.

The English company is now making a majority of the parts formerly shipped from Detroit, and this, they say, makes the cost of production much less. Officials here say the horsepower tax is assessed against the buyer and are inclined to believe it had nothing to do with the price reduction.

ELGIN RACE OFF ONE WEEK

CHICAGO, Aug. 24—The Elgin road race has been postponed from Aug. 21 to Aug. 28 because of rain.

Darracq-Sunbeam Acquires Du Cros

Still Further Strengthening of British Combine Seen in New Addition

LONDON, Aug. 5 (*Special Correspondence*)—The recently announced amalgamation between the Darracq company and the Sunbeam Motor Co. has received the approval of the required majority of the Sunbeam shareholders, stipulated as a condition of the amalgamation by the Darracq company. More recently the W. & G. Du Cros Co., maker of the W. & G. commercial lorry, with the whole of its engineering, body building and works at Acton, has been acquired, together with all the share capital of the W. & G. Du Cros Co. in exchange for an agreed number of Darracq 7 per cent cumulative preference shares.

This last absorption will have the effect of rendering more formidable the Darracq-Sunbeam-Talbot combination of interests in the motor industry, as the number of companies which will now come under the control of the parent company include the Anglo-French Darracq Co., the Sunbeam Motor Car Co., Clement-Talbot Motor Co., Heenan & Froude, engineers of Worcester and Manchester, Jonas Woodhead & Sons, engineers of Leeds, and W. & G. Du Cros, Ltd.

The Sunbeam Co. is making aircraft and car engines; the Talbot Co. makes car engines, but is reported to be interested in a new truck; W. & G. Du Cros Co. has specialized in the light tare truck; the Heenan & Froude Co. is making a well-known water brake for testing engines; the Jonas Woodhead Co. is the best known British maker of motor vehicle leaf springs.

The latest fusion will be up against the still more formidable combine of the Vickers and Beardmore groups, which control also the output of most of the materials required, *i. e.*, have their own foundries and forges for steel and other metals. It will be interesting to see what effect, if any, their pooled interests will have in furthering the much-needed cheap British car.

BRITISH SHOW SITE NOT CHOSEN

LONDON, Aug. 8 (*Special Correspondence*)—No decision has been reached as to the location of the next British motor car show. It is probable that the exhibit will be divided between Olympia and the White City unless some means is discovered of accommodating all applicants for space in Olympia. Though there is some desire expressed to hold the show exclusively in White City, which is large enough to accommodate all, this does not meet with the favor of the majority, and is opposed by A. S. Mays-Smith, new president of the Society of Motor Manufacturers and Traders, Ltd.

Co-operation Pledged New Maxwell Forces

Distributors and Branch Managers Like Chrysler Plan—
Personnel Changes Made

DETROIT, Aug. 22—Co-operation with the new controlling forces of the Maxwell-Chalmers organization was enthusiastically pledged by 200 Maxwell-Chalmers distributors and branch managers who met here last week. The meeting was held on Wednesday for Western representatives of the company and on Thursday for those from the East, both being addressed by Walter P. Chrysler, vice-president of the Willys Corp., who was recently appointed chairman of a managing committee for Maxwell-Chalmers by financial interests supporting the company.

During the meeting it became known that A. E. Barker of the Dodge Brothers sales organization had been made general sales manager of Maxwell-Chalmers, succeeding B. A. Lyman, who held the title of director of sales. It was also stated that C. C. Hanch had retired as general manager, though no announcement was made as to his successor.

It appears likely that Charles Adams, production manager, eventually will be placed in charge of the plant, although Chrysler has declined to make any official announcement to this effect. Whoever is appointed, the new general manager will have absolute control over administrative policies.

There already have been several resignations from the executive personnel. Positions vacated have not been filled. C. L. Halladay, assistant to Hanch, has resigned, as have C. E. Uebelacker, assistant to President Mitchell, and E. J. Miles, chief engineer.

The Maxwell-Chalmers plant has been closed for more than two weeks, only about 300 men being employed to take care of the machinery and equipment, but production will be resumed as soon as the program for changes in administration is complete.

Bankers Act on Finances

NEW YORK, Aug. 25—Details of the reorganization of the Maxwell company and the merger with it of the Chalmers company have not yet been worked out in detail, but a tentative decision has been reached on the broad general aspects of the plan. The bankers back of the company are convinced that the hardest part of the road has been covered and that the future of the two companies is assured.

The refinancing plan calls for an advance of \$15,000,000. Two-thirds of this amount will be used to liquidate a part of the Maxwell company's obligations and the remainder for working capital. It has been virtually decided that creditors with claims of less than \$100,000 will be paid in full. Creditors whose claims are in excess of that amount will

receive one-third in cash and a series of notes for the balance. In liquidating obligations, banks and merchandise creditors will be given the same treatment. The management committee believes that the notes can be paid out of profits without difficulty and that in this way the earnings of the merged companies will be sufficient eventually to wipe out the present bank indebtedness, which amounts to approximately \$12,500,000.

Under the merger plan, the securities of the old companies will be exchanged for those of a new corporation, the basis of this exchange to be agreed upon.

The only financial difficulties of the Maxwell company have resulted from the heavy burden of bank charges which it has been carrying. Without them it would have returned profits which would have been considered entirely adequate, and bankers are confident that under the plan they have evolved and with \$5,000,000 additional working capital, the troubles of the company will be over.

German Makers Seek Restriction Removal

WASHINGTON, Aug. 23—German automobile manufacturers and dealers have brought pressure to bear on their Government in an effort to remove all restrictions on the industry, according to dispatches from American consular agents in Berlin. The Association of German Motor Vehicles Manufacturers has conducted meetings throughout the country, especially in localities where automobiles are extensively used. While foreign sales have almost ceased, the German dealers hope to stimulate domestic demand through removal of the control of motor spirit which has driven up the price of benzine and benzol to its present height.

The American commercial attache reports the stagnation in sales could be attributed to the official orders curtailing motor traffic. The managing directors of the factories have notified the Government that the plants will be shut down unless immediate relief is accorded. Not only no new sales are being effected, but contracts already closed are being cancelled, as customers no longer believe that they can obtain possession of their vehicles within a reasonable period.

SYRACUSE REST DAYS END

(Continued from page 436)

"When it first seemed advisable to reduce our working forces we dropped those men who had been absent one or two days each week with more or less regularity. As soon as they were let out the men who had been retained realized that there was a similar prospect for them. Our list of absentees diminished rapidly and we got a much more efficient production from our employees. The general tendency on the part of many of the men had been to work four or five days and then take a rest. They had all the money they needed and seldom hesitated to leave their machines unmanned."

SPECIAL CABLES

French Buyers Wait Price Reductions

Industry Passing Through Crisis
—No New Orders Reported—
Resent Recent Raises

(By Cable to Automotive Industries)

PARIS, Aug. 23—The French automobile industry is now passing through a critical period. During the past six weeks few orders have been placed and in some instances factories have not received a single order in that time. In addition, many persons who were prospective customers have taken advantage of the delay in delivery to countermand orders. All factories are one year behind in their deliveries and are living on the business which has been on their books for months.

Considerable numbers of workmen already have been laid off in some of the factories, and the others fear that unless there is a prompt revival they will be obliged to reduce their staffs. The sudden decision of the public to abstain from purchasing automobiles has behind it the belief that next spring will see the retail price of cars cut in two.

Dullness in the automobile industry is not confined to France, for there has been a serious decline in business in England, Belgium, Italy and Spain. In this country buyers object strenuously to price increases made during the last six months. In order to make sales, some manufacturers have been obliged to deliver cars at the original prices quoted, which are in some instances 50 per cent less than the present list prices.

The French motor tractor trials will be held near Chartres, Oct. 1-6. Entries have been received from 48 manufacturers in France, the United States, England and Italy for 108 types of machines. This will be the most important competition ever held in France.

Five French airplanes have been entered for the James Gordon Bennett trophy race which will be held Sept. 26. Elimination trials will be held to select three representatives for this country. No nation will be allowed to have more than that number of entries. The competitors in the elimination event will be 2 Spads, 2 Nieuports and 1 Borel.

The French company recently formed for the exploitation of a pipe line to carry gasoline and heavy oil from Paris to Havre has placed a contract for its construction with the James Stewart Company of New York. Work will be started in two months and the pipe line ought to be in operation by the winter of 1921.

BRADLEY.

Lake Shipping Makes Chicago Car Center

**Deliveries by Boat Increase as
Rail Congestion Continues
—Driveaways Numerous**

CHICAGO, Aug. 20.—The plan of helping to relieve the freight congestion and to expedite deliveries of automobiles to points north, south and west through lake shipment from manufacturing centers to Chicago has met with greater success than its sponsors hoped for. Because of keen interest shown by shippers in the possibilities it is probable that the city will become more and more of a distributing center for automobiles through lake shipments until rail transportation facilities are materially improved.

The municipal pier with its great storage capacity is the center for distribution. It has no rail connections, but Chicago is well equipped with railroad lines and it is a small matter to move the automobiles, which are shipped by the manufacturers fully assembled, to the freight cars to be sent to different parts of the country for delivery. Those consigned to Chicago and vicinity are called for by the dealers or driven away by the purchasers.

At the time of the armistice, when the Government was the tenant, the pier held something like 5000 War Department motor trucks in storage. After the cessation of hostilities these were altered on the pier to meet the new uses to which they were to be put and turned over to the different states to aid in highway construction.

Thousands of cars have been received at the pier from most of the best known manufacturers in Detroit and Cleveland. Five freighters owned by boat companies in these two cities, with a capacity each of from 150 to 240 cars, land at the pier, those from Detroit making weekly round trips and those from Cleveland covering the round trip in eight days. Two companies organized to promote automobile shipments by lake act as the forwarding agents here.

MEXICAN AIR RIGHTS SOUGHT

OTTAWA, Aug. 23.—A syndicate of Canadians has been formed to seek a concession from the new government in Mexico for a passenger and freight airplane service in that country. The syndicate is headed by Brigadier General Critchley, who was in command of the entire British aerial training service the latter part of the world war. Major Locke, another Canadian officer, is associated with him.

Their plans, now before President de la Huerta, propose to use Handley-Page planes, with a carrying capacity of fourteen passengers. The first line, if the concession is granted, will be established from Mexico City to Tampico. The planes will be handled by English and Canadian aviators and the service will

start within two months after the concession is granted.

General Critchley also offers to start a British aviation school to teach Mexicans, and in addition he offers to maintain a flotilla of war planes to be used by the Government in case of necessity. Major Locke states that the planes will be equipped with wireless telephones, with a range of 100 miles.

Interpretation Sought on Indiana Road Levy

INDIANAPOLIS, Aug. 20.—Approximately \$8,000,000 for Indiana roads hangs upon the question as to just what the recent special session of the Indiana General Assembly did in one of the laws passed near the close of the session.

If the law in question took away the power to scale down the levy for the State Highway Commission from the State Tax Board then the commission will have about \$4,000,000 more for highway improvement in 1921 than was available this year. To this must be added the \$4,000,000 derived from the Federal Government, making \$8,000,000 in all.

Attorneys selected by the Hoosier Motor Club to investigate the matter reported that in their opinion the law had deprived the State Tax Board of all authority over the finances of the highway commission. The case eventually may be carried to the courts for decision.

BUSINESS MEN BACK ROADS

ATLANTA, Aug. 23.—More than 100 miles of paved and improved roads radiating in all directions from Pensacola, Fla., constitute the general plans of the good roads commission of Escambia county, Sept. 15 having been proposed as a date for holding a general election for a \$2,000,000 bond issue, the money to be used for the above purpose. In order that the proposition will be certain to carry a committee has been appointed to secure subscriptions from the business men to pay the costs of the special election, and to carry on an educational campaign to prove to the voters that they should favor the issue. One of the projects proposed includes the construction of the road known as Gulf Beach Highway from Pensacola to the Gulf of Mexico, a distance of 12½ miles.

TO ENLARGE FORD-MILWAUKEE

MILWAUKEE, Aug. 23.—Announcement is made that the Ford Motor Co. will proceed with the construction of a two-story addition, 150 x 340 ft., to its present six-story assembling plant here. The enlargement will provide facilities for the assembling of engines and other new processes, including manufacture of fenders and other sheet metal work, enameling, etc. The daily motor capacity will be from 135 to 150, and 80 skilled men will be added for this purpose. In all, the force will be increased to approximately 600.

Find Trucks Excel Freight Waterways

**Economy Shown at Meeting of
Southern Delegates—Show
Value of Co-operation**

NEW ORLEANS, Aug. 21.—One of the most interesting facts brought out at the recent meeting of inland-waterways and water-transportation experts at New Orleans was the admission that the waterway freight system cannot compete successfully with any well-operated motor truck system. It was admitted by several delegates that the much-talked-of inland waterway systems, wherever paralleled by good roads over which motor trucks and trailers are operated, soon go out of business, except for long hauls.

The consensus was that the motor truck can be operated much more economically, run much faster and kept on better schedule than the steamboat or the motorboat or the barge tow. The single advantage of the barge tow, however, is that four or five barges in a string can carry more freight than any motor truck train of trailers yet put out. It was acknowledged, however, that the use of the waterways will always be paramount in sections of the country where the soil is of such marshy character that improved highways, capable of sustaining heavy truck traffic, cannot be built.

This condition is true of a large part of the 12,000 square miles of marsh and swamp in western and southern Louisiana, and the meeting, which was called and presided over by Major E. L. Dent, United States district engineer in charge of waterways in Louisiana and east Texas, formulated a petition to Congress asking for immediate completion of the link of the Intercoastal Canal between New Orleans and Orange, Tex., connecting the Mississippi and Sabine rivers, respectively, at those points.

Would Lower Freight Rates

Co-operation between the water lines north and south in the Mississippi Valley and east and west along the gulf coast and on the Intercoastal Canal and motor truck lines was urged by all the 75 delegates as the only means of beating the present high, and future higher, freight rates of the railroads. One of the delegates declared his knowledge of a freight handler who operated two motor freight boats and four motor trucks, and that this operator's expenses for maintenance and operation of his two boats was nearly twice as great as that for his four trucks.

The advancement of a road-building program involving some \$50,000,000 in the five gulf-bordering states was stressed by some of the delegates as forecasting the end of inland waterway transportation over the greater part of the lakes, streams and canals of those states. These delegates held that the main future for inland waterway freight carriers lay in economical co-operation with motor truck lines.

Canadian Highways to Cost \$40,000,000

Ontario and Quebec Get Approval of Projects to Connect Im- portant Cities

OTTAWA, ONT., Aug. 21—Plans that provide for the expenditure of \$40,000,000 to better the highways of Ontario and Quebec are among those which have been approved by the Government under the operation of the Federal Highways Act. The total outlay contemplated in Ontario is \$22,200,000, of which the Dominion Government will contribute \$6,800,000, the Province \$12,000,000 and the municipalities \$4,400,000. Quebec's projected outlay is \$17,390,000 of which the Dominion Government will put up \$5,000,000 and the province and municipalities the balance.

In Quebec three standard highways, including the King Edward highway Montreal to Rouse's Point, the Quebec and Montreal North Shore road and the road from Levis to Jackman, Maine, are already finished or practically so. The plans submitted all conform to the standard prescribed by the act and when the system is completed vehicular traffic will be revolutionized. The roads that are planned are all trunk or main highways as distinguished from country or township roads.

The Ontario plan provides for the following main highways—Windsor to the Quebec boundary at Coteau via Chatam, London, Brantford, Hamilton, Toronto, Belleville and Kingston, with branches from Prescott to Ottawa. Fort Erie through Simcoe and St. Thomas to Windsor. Toronto to Sarnia via Brampton, Guelph and Stratford; Toronto to Muskoka. Ottawa to Pembroke, Ottawa to Point Fortune, connecting with the road to Montreal; Ottawa to Kingston via Perth and the Rideau Lakes.

The plans of the Quebec Government which have been approved are for first class highways as follows: Hull to Montreal, Montreal to Levis, Levis to Remouski, Rivereduloup to Edmonton, connecting with the St. John Valley Highway, Montreal to Sherbrooke via Granby and Magog, Montreal to Malone, N. Y., via Chateaugay and Huntington, Montreal through the Laurentians to Mont Laurier. The present year will see work well advanced on many of these roads. All of the provinces are in the scheme and their general plans were approved by the cabinet at the week-end.

QUEBEC TO SEE TRACTORS

MONTREAL, QUE., Aug. 21—The plowing match, tractor and farm machinery demonstration which will be held at the Macdonald College Farm on Oct. 12, 13 and 14 next is attracting considerable attention. The tractor has not made the same headway in Quebec as it has in the other provinces, but the proposed demonstration should have a considerable educative effect. The Quebec Government is

co-operating to make the demonstration a success, as it is realized that the agricultural interests of the Province would be materially advanced by the more general introduction of power farm machinery. The demonstration is being held under the auspices of the Eastern Ontario and Western Quebec Ploughmen's Association, and practically the same officials who made such a conspicuous success of the Ottawa demonstration last year will be in charge this year. A good program and list of prizes has been arranged. L. C. McQuat of Macdonald College is secretary. The president is John Hay, M. P. P. of Lachute, Que.

Louisiana Youths Tractor Enthusiasts

NEW ORLEANS, Aug. 21—"The gospel of trucks and tractors and the advantages of the latest motor-driven farm machinery will be spread throughout the State of Louisiana by 122 enthusiastic apostles," said Thomas H. Harris, State superintendent of education, as he stepped from the special train which brought back to New Orleans the 122 farm boys, who, in August, toured the leading farming and dairy sections of the Mississippi Valley and visited the most progressive of the agricultural schools of the United States.

The boys ranged from 14 to 20 years of age, and were selected from the high schools of the State which have shown the greatest advancement in agricultural subjects and modern farming methods. Their expenses were paid by the parishes from which they came and by civic improvement associations throughout the State. They will act as demonstrators of modern farming methods for the new Louisiana State Agricultural College during the vacations, and one of the conditions on which they made the trip was that they be allowed to tell the people of their districts the results of their tour of the northern farm belt. Distributors of truck and tractors are arranging to supply these boys with demonstrations of modern farming machinery.

LAFAYETTE IN PHILADELPHIA

PHILADELPHIA, Aug. 20—The LaFayette will be handled in Philadelphia by the LaFayette-Philadelphia Co. The company was organized by Edwin I. Hyneman and Robert M. Drayton, both prominent in Philadelphia business and club circles. Gerrit M. Judd, formerly with the Foss-Hughes Co., Pierce-Arrow distributors in Philadelphia, will act as general sales manager.

G. M. C. GEAR PLANT CLOSED

DETROIT, Aug. 23—The steering gear plant of the General Motors Corp., at Saginaw, has been closed down and will remain closed for a month, according to announcement this week. Over-production due to the fact that the other divisions were unable to keep to schedules caused the shut-down. About 750 employees are affected by the order.

Capper to Convert Bankers to Trucks

Kansas Senator Heads Big Mis- sionary Move Into South- western Farm Zone

ST. LOUIS, Aug. 23—An expedition to teach the gospel of the motor truck and tractor throughout the Southwest left St. Louis yesterday, headed by Arthur Capper, United States Senator from Kansas and publisher of a string of influential farm papers. F. W. Fenn, secretary of the motor truck committee of the National Automobile Chamber of Commerce, is Capper's personal guest and will supply much of the ammunition which will be fired along the way.

The main purpose of the party, which numbers about 30, including 20 automobile advertising men, is to conduct missionary work among the bankers in the territory visited. The trip will consume two weeks and in each city and town visited the members of the party will interview not only bankers but farmers, dealers and distributors.

Bankers will be sold on the essentiality of trucks and tractors. Especial emphasis will be placed on their value in the great agricultural sections of the Southwest as an aid to economical production and to make up any deficiency in farm labor. They will be told that they offer the best kind of security for loans and that liberal credits for their sale are entirely justified. They will be told the views on this subject of the leading bankers and financial experts of the country. Some sections of the Southwest still are laboring under the delusion that a Federal Reserve edict has gone forth against the acceptance of any kind of automotive paper.

No Horses on Capper Farm

Where the farmers need education as to the value and economy of trucks and tractors, they will be educated. Dealers and distributors will be given advice as to the best means of increasing sales and they will be encouraged to new effort.

From St. Louis the party went to Topeka and from there to Kansas City. They will then go down through Oklahoma into Texas and back to Kansas, Nebraska and Iowa.

Capper is one of the country's most earnest advocates of motorized farms. He hasn't a horse on his own estate, which embraces several thousand acres. He also believes that truck and tractor makers have not visualized the wonderful market which exists in the Southwest.

"In my opinion," he says, "the potential market in the Middle West has not yet been captured by the motor truck manufacturers. Despite economic buying limitations, which in themselves will disappear each year more and more as a higher level of prosperity is reached through the extension of power farming, there exists to-day a market almost untouched and under-developed."

Prosperity in Cuba Creates Car Demand

Commerce Director Sees Opportunity for Firm Establishment of American Products

WASHINGTON, Aug. 21—Expansion of American trade with Cuba in automotive products has been predicted by Director Roy S. MacElwee of the United States Bureau of Foreign and Domestic Commerce, who returned to-day from an inquiry into commercial relations with the neighboring republic. Because of the unusual prosperity of the Cuban peoples, there has been a heavy demand for motor vehicles. The Government official believes that Americans could establish and maintain profitable sales agencies, especially where repair shops are installed.

Director MacElwee in an interview with AUTOMOTIVE INDUSTRIES said Cubans have manifested quickened interest in motor transportation since the price of sugar products advanced. Extravagance continues to grow until the authorities are at a loss as to methods to curb the heavy expenditures. Any type of motor vehicle capable of operation brings high prices, principally because port congestion prohibits prompt delivery of new cars.

A few German cars will be found but the English manufacturers have little or no market in Havana. The development of the new suburb Veado has created a heavy demand for automobiles. Garage space is at a premium. Repair shops are hopelessly inadequate in numbers. The natives flushed with money insist upon remaking the bodies, particularly changing the design of the hoods.

Progressive planters have pressed motor trucks into service to bring their products to the markets. The highways have discouraged the growth of this trade. Heavy trucks have been much in demand for short hauls in the provinces. The wooden bridges in many provinces have collapsed under the strain. Light trucks are used principally in the cities.

Venezuela Offers Farm Power Market

NEW ORLEANS, Aug. 21—The Government of Venezuela, through its agricultural department, will import 20 motor trucks and 10 tractors, the latter equipped with the best obtainable agricultural implements, for use on experimental coffee, sugar and rice plantations throughout the country. Eduardo G. Mancera, a member of the Venezuelan senate, and one of the most successful farmers of that country, arrived in New Orleans in August, on his way to confer with officials of the United States Department of Agriculture concerning the use of automotive farming implements, and to buy the truck and tractors wanted by the Venezuelan Government.

"All Central America needs improved methods of agriculture," said Senator Mancera, "but we cannot seem to get American manufacturers and exporters sufficiently interested to send us machines and demonstrators to show us how best to use trucks and tractors and to explain to us which are the best for our purposes. We have in Venezuela a varied agricultural field, ranging from the boggy rice lands to the fruit country of the steep and high hills, with the rolling plains and lower hills covered with the coffee, cacao and sugar plantations.

"The Government has sent me to the United States to get in touch with these exporters and manufacturers and to learn which machines are the best adapted to Venezuelan agriculture.

Automobile Imports Forbidden by Norway

NEW YORK, Aug. 23—Exporters of American automobiles have learned that the government of Norway has forbidden the importation of articles of luxury and that automobiles are placed in this category. The ban became effective Aug. 19.

The action was taken in order to halt the decreasing value of Norwegian money, largely caused by overwhelming imports, while exports declined. American trade is thereby restricted, as the greater part of the articles named have been imported from America.

The high dollar rate had already restricted the purchase of American goods. This rate to-day was 6.67 kroner to the dollar, as against the normal rate of 3.72.

The import ban will have considerable effect in this country, for 95 per cent of the automotive imports of Norway of late have been from the United States. The people of that country have learned that American cars really compare favorably with those made in Europe, and the dealers there declare they do not believe European manufacturers ever will regain the markets they have lost in Scandinavia. As one correspondent says: "They may export a few hundred cars to us yearly, but the thousands we will get after this from America."

GUATEMALA TO BUY TRACTORS

NEW ORLEANS, Aug. 20—Guatemala's government is in the market for motor trucks and tractors, the latter equipped for work in sugar, rice, coffee and lumber, according to E. M. Lawton, United States consul general at Guatemala City, who passed through New Orleans in August, on his way to Washington prior to going to his new post as consul general at Sao Paulo, Brazil.

"The only thing needed to sell American trucks and tractors in Guatemala," said Lawton, "is the sending of demonstrators, equipped with suitable trucks and tractors by American manufacturers and exporters to that country. These automotive vehicles can be sold best by first dealing with the agricultural department of the government, which is establishing an agricultural college."

Michigan to Give Short Road Courses

Specialized Engineering and Transportation Offered in Two Week Periods to Graduates

ANN ARBOR, MICH., Aug. 21—Several graduate short period courses in highway engineering and highway transport will be given at the University of Michigan during the coming college year. This is probably the only educational institution in the country offering short graduate courses designed especially for men engaged in highway engineering and transport. The program arranged follows:

Dec. 8 to 21, 1920

- C. E. 76. Highway Engineering Theory, Design and Economics. Professor Blanchard.
- C. E. 78. Grading Machinery and Operations. Professor Bateman.

Dec. 27, 1920, to Jan. 7, 1921

- C. E. 67. Highway Transport Surveys. Professor Blanchard.
- C. E. 71. Highway Specifications, Contracts and Jurisprudence. Professor Riggs.

Jan. 10 to 21, 1921

- C. E. 72. Earth, Sand-Clay, Gravel and Broken Stone Roads. Professor Bateman.
- C. E. 81. American and English Highway Transport Methods. Professor Blanchard.

Jan. 24 to Feb. 4, 1921

- C. E. 68. Bituminous Surfaces and Bituminous Pavements. Professor Blanchard.
- C. E. 74. Bituminous Materials. Professor Bateman.
- C. E. 80. Interrelationship of Highway, Railway and Waterway Transport. Professor Riggs.

Feb. 7 to 18, 1921

- M. E. 40. Mechanism, Operation and Maintenance of Motor Trucks, Tractors and Trailers. Professor Lay.
- C. E. 69. Highway Laboratory Research. Professor Bateman.
- C. E. 70. Highway Structures. Professor Gram.
- C. E. 79. American and English Highway Traffic Legislation and Regulations. Professor Blanchard.

Feb. 21 to 25, 1921

- Seventh Annual Michigan Conference on Highway Engineering.

Feb. 28 to March 11, 1921

- C. E. 73. Brick, Cement-Concrete, Stone Block and Wood Block Pavements. Professor Bateman.
- C. E. 75. Highway Engineering Seminar. Professor Blanchard.
- C. E. 82. Highway Transport Management, Costs and Record Systems. Professor Blanchard.

March 14 to 25, 1921

- C. E. 77. Highway Engineering Financing, Administration and Organizations. Professor Blanchard.
- C. E. 83. Highway Transport Seminar. Professor Blanchard.

HAMILTON MAPS OUT CAMPAIGN

GRAND HAVEN, MICH., Aug. 23—Inaugurating an intensive sales campaign in which district managers will be located in every section of the country, Hamilton Motors Co. has appointed D. C. McIntire in Pacific Coast territory and W. E. Kalaman, who will have charge of the Kansas City zone. McIntire, whose headquarters will be in Frisco, formerly was connected with the transportation engineering department of the Four Wheel Drive Truck Co. Kalaman formerly was with Harley Davidson. His headquarters will be at Kansas City.

Government Probes Coast Gas Shortage

Disclosures of Alleged Violations of Shipping Regulations One of Points Investigated

LOS ANGELES, Aug. 23—Official investigation of alleged gasoline shortage in California has begun here following receipt from Attorney General Palmer of authorization for the probe. The inquiry will be conducted by District Attorney O'Connor of the Southern district, and District Attorney Silva of the Northern district. Officials are granted permission to use agents of Department of Justice in the investigation.

O'Connor asked for authority to make the investigation because of disclosures by James Payne, special assistant to the attorney general and attached to the Interstate Commerce Commission. Payne has been here several months investigating charges that oil refiners violated the Interstate Commerce laws by labeling gasoline shipments as distillate and thus securing, it is alleged, cheaper freight rates. The grand jury is now considering the matter.

It is alleged the investigation also revealed that the recent shortage of gasoline here was fictitious and due to manipulation. Allegations are made that the refineries created the shortage by shipping gasoline from here to northern parts of the state and then after waiting until the price advanced here bringing it back again for sales purposes.

It also is charged that refineries have attempted to cloak their actions by shipping gasoline from midcontinent points, thus giving the impression a real shortage existed here. It is because refineries are located in both the northern and southern districts, and that operations overlap that it was necessary for joint action on the part of United States district attorneys.

Plenty Now at Higher Price

SACRAMENTO, CAL., Aug. 23—Coincident with a three and one-half cents increase in the price of gasoline, the shortage of motor fuel in California has ended. Logical reasons are assigned both for the end of the shortage and the increase of price; but the motoring public can see but the two results without the causes.

Gasoline in San Francisco and Los Angeles now is selling for 27 cents a gallon. Here it is half a cent more and correspondingly higher as points further interior are reached. The price increase since March 1 has been five and a half cents, an increase of approximately 25 per cent.

This price increase of March, it was announced at the time, was necessary because gasoline was being purchased here, shipped to New York and sold at a profit. To remedy this "differential" a two-cent price increase was ordered. Then gasoline went up again in New

York and another differential was set up. But this didn't seem to affect the situation the second time.

After several weeks of shortage, the companies began importing gasoline from Texas and other oil fields to the east. This, they claim, costs them 35 cents a gallon. It is mixed with the local product and is sold at a compromise price. Evidently the imports arrived on the same day, for the price was boosted simultaneously.

Officials at the oil companies said, however, the end of harvest has caused a great decrease in the demand for gasoline, and this, more than anything else, explains the end of the shortage. The Associated Oil Co. says it has no more gasoline than during the shortage, but the other companies are getting more, due to importations.

The oil companies, despite the shortage and consequent importations and "losses" still are doing very well in California. The Associated Oil Co., in a report recently issued, shows net profits of \$6,000,000 for the first six months of the year, as against \$10,000,000 for the entire twelve months in 1919.

Trade Conditions

Take Better Turn

(Continued from page 437)

up in raw materials or finished goods on hand are evident in many of the statements and it is this situation which has caused apprehension on the part of bankers. For that reason they are doubly gratified at the turn of the tide the other way.

Notwithstanding the difficulties which are besetting business because of readjustment, the country is undeniably prosperous. The volume of trade and commerce now being carried on would have been considered prodigious in the pre-war period. It is highly probable, however, that there will be further curtailment during the rest of the year and possibly until spring. By that time normal conditions probably will have been restored and the country can look forward to a long period of prosperity unless the depressing European situation or some other unexpectedly disturbing factor exercises an adverse influence.

NEVERTHELESS, AND IN SPITE OF ANY IMPROVEMENT IN CONDITIONS, EVERY ONE ENGAGED IN THE AUTOMOTIVE INDUSTRY SHOULD PROCEED WITH THE UTMOST CAUTION. BUSINESS FORESIGHT AND SAGACITY NEVER WERE MORE ESSENTIAL THAN THEY ARE NOW. FOR WITH WORLD AFFAIRS AS THEY ARE, NO MAN CAN PREDICT WITH SAFETY WHAT IS GOING TO HAPPEN IN THE NEXT FEW MONTHS.

CONTINENTAL TIRE TO BUILD

DALLAS, TEX., Aug. 20—Erection of a cotton mill to cost \$500,000 is planned by the Continental Tire & Rubber Co., the mill to be built at Stamford, which is in the heart of the high-grade cotton section of the State.

M. & A. M. A. to Hold Important Sessions

Credit Department and Advertising Managers Council to Con- vene in General Meeting

NEW YORK, Aug. 23—A general get-together meeting of the Motor and Accessory Manufacturers' Association will be held at Cleveland, Sept. 16-18. The occasion will be virtually simultaneous meetings of the Credit Department and the Advertising Managers Council.

The credit meeting will be a general session of the various groups and it will be held at the Statler hotel, Sept. 16 and 17 with a golf tournament the 18th. The advertising men will gather at Camp Nela, Nela Park, Sept. 17 and 18. They will be invited to a banquet of the credit men at the Statler on Thursday evening. Their two days stay in camp promises to be pleasant for the tents they will occupy are comfortably furnished and have board floors. There will be no individual cooking, for meals will be served in the dining hall. They will have a chance to enjoy midnight tennis and swimming.

It is probable a joint session of the credit and advertising sections will be held to discuss general conditions in the industry. Place will be given on the program for consideration of recent developments in the automotive field.

The session of the credit department is expected to be one of the most important and profitable ever held. The value of this branch of the association's work is becoming more and more apparent as the result of the unsettled conditions which now prevail. Invaluable information is being obtained from various sources concerning the financial standing and stability of companies to which the members of the organization sell their product. Frequent bulletins are sent out to members and the facts thus presented to them have more than once prevented heavy losses.

MOORE BRIEFS FILED IN COURT

DANVILLE, ILL., Aug. 24—Both sides have waived oral arguments in the case of the Moore Motor Vehicle Company, in which disgruntled stockholders asked for the appointment of a receiver. Briefs have been laid before Judge George W. English by the attorneys for the petitioners and company, and a decision is looked for shortly, waiving of the oral arguments will save time for all concerned.

TRUCKS AID RECORD MONTH

PITTSBURGH, Aug. 23—One of the large independent steel interests in the Pittsburgh district made the remarkable record in July, in the face of transportation difficulties, of shipping out a greater tonnage than in any month in its history. This was done by intensive use of motor trucks, which carried the greater part of the tonnage.

Oakland Restrains Price Cut on Cars

Sues Indianapolis Distributor to Recover Stock at Original Sales Price

INDIANAPOLIS, Aug. 21—An interesting legal question of the right of an automobile factory to repurchase the cars sold to an agent at the original sale price after the market price had been advanced by the company was brought up last week in a suit filed by the Oakland Motor Car Co. against Lee F. Justice, formerly Oakland distributor in this territory.

The question was brought up in a suit for injunction filed by the Oakland company against Justice in Superior Court asking that he be restrained from selling the Oakland cars in his possession at less than the advertised retail price, and that he be compelled to turn the cars back to the factory at the price he paid for them under the terms of the contract.

Justice contended that he is entitled to receive the present price on the cars, which is higher than the price he originally paid, on the ground that the machines could not be duplicated for the price originally paid and that the Oakland company has had the use of his money for several months.

Judge Moll granted a temporary restraining order forbidding Justice to sell the cars he now has at less than the advertised price, and the case will be fought out in court later. The case was set for hearing Aug. 17, but on request of both sides was continued.

Huffman Stockholders Ask for Receivership

OMAHA, Aug. 23—Receivership and an accounting for Huffman Bros. Motor Co., manufacturers of motor trucks and passenger cars at Elkhart, Ind., is asked in a stockholders' suit filed in this city. The company is incorporated under the laws of Delaware. Plaintiffs in the suit are Andrew K. and Bertha Nelson, and Elmer and Emelie Billings, all of Omaha, who claim to own 750 shares of stock.

Their petition alleges that W. L. Huffman, L. R. Huffman, W. M. Clement and R. S. Weltrout are merely de facto officers of the company not duly elected by stockholders; that they have conspired to cheat and defraud stockholders by assuming and exercising exclusive control and management of the company's affairs; that they have appropriated and converted to their own use large sums of money belonging to the company, and that by negligent management they have dissipated the company's assets.

They ask that the books of the company be brought into court and an accounting made; that the alleged de facto officers be enjoined from further exercising their duties as such, and that a

receiver be appointed for the company.

John O. Yeiser, attorney for the defendants in the action, privately has uttered a general denial of the allegations and declares that the suit is brought merely to embarrass the company. He declares the suit cannot legally be brought in Nebraska, as the corporation was organized in Delaware and the factory is in Indiana. The defendants have until Sept. 20 to make formal reply.

Buckeye Rubber Buys Polack Tyre Company

NEW YORK, Aug. 24—The Polack Tyre & Rubber Co., which was organized in 1912 by Hugo Hoffstaedter, has been sold to the Buckeye Rubber Products Co., of Cleveland, with a factory at Willoughby, Ohio. The Buckeye company is controlled by men who formerly were connected with the United States Rubber Co. and the Mason Tire & Rubber Co. It is headed by C. H. Roth.

The new owners will continue operations in the leased plant of the Polack company at Bridgeport until a duplicate factory can be erected at Willoughby. The Bridgeport plant then will be abandoned. General offices will be retained in this city. Manufacture of the Polack tire will be continued, but present plans do not contemplate the making of pneumatics.

Hoffstaedter is widely known in the tire industry. He was one of the pioneers who introduced the old Continental tire into this country some fifteen years ago. He installed the first pneumatic tire repair and service station in New York for the Continental company and made similar installations in the principal cities of the United States. He was connected with the automotive industry in England and other countries and has traveled in nearly every part of the world where automobiles are used extensively. His future plans have not been announced.

LOUISVILLE AIRLINE STARTS

LOUISVILLE, Aug. 23—A new era in transportation in Louisville was inaugurated at 9.30 o'clock this morning when two hydroairplanes of the Ohio Valley Transportation Co. departed on an initial trip to Cincinnati. A reception committee composed of the aerial transportation committee of the Cincinnati Chamber of Commerce and city officials greeted the planes on arrival at the Queen City. The planes returned to Louisville about 3 o'clock in the afternoon.

VULCAN TO LOCATE BRANCH

MONTREAL, Aug. 23—A branch of the Vulcan Motor & Engineering Co., a famous English automobile concern, soon will be established in Canada, according to an announcement made here by Walter S. Walker, general manager of the company. The English plant at Southport was devoted to the making of airplanes during the war, but since the armistice has returned to the manufacture of passenger cars and trucks.

Syracuse Factories Maintain Operations

Franklin Cuts Force and Goes on Four-Day Schedule—Other Plants Active

SYRACUSE, Aug. 23—Although there has been a considerable cut made in the working forces in some of the Syracuse automotive industries this city has not felt the effect of a flood of unemployed labor. Until a few weeks ago more than 35,000 men had been employed in the production of motor cars, trucks, tires, gears, differentials, transmissions and automobile steel, aluminum and other components.

When the general wave went through the industry there was a shutting down from 100 per cent production. No plant, however, has stopped production entirely and in only one plant has there been a marked decrease in operation.

At the Franklin plant there was a reduction of the working force to what was called an efficiency basis, several weeks ago. Men who had not been producing up to a standard were let out. They were taken up, however, by the other industries of the city.

Soon afterward, however, the entire plant was put on the basis of four days per week. It is not expected that there will be any further reduction, but that within a short time the plant will resume an increased program. Extensions to the company's buildings continue in spite of the decreased production.

At the Brown-Lipe-Chapin plant, which produces a considerable portion of the differentials used in the cars of the General Motors Corp., there has been a slight let up in the production of complete units. It was said at this plant, however, that manufacturers who had stocked up to capacity on new units were now replenishing their supply of repair parts. A large part of the plant is working on special parts work now. The same condition obtains at the kindred plant of the Browne-Lipe Gear company.

Parts Makers Booked Ahead

The Weekes-Hoffman Gear Corp. and the Durston Gear Co. are operating on only a slightly modified scale, while the New Process Gear Corp., which is a subsidiary of the Willys companies has been advertising for more men. It could not be learned what work was providing employment for the additional force at this plant but it understood that there is enough business in prospect there to keep the plant at high production for some time.

The Syracuse Rubber Co., which produces the Syra-Cord Tire has limited its operations only slightly and expects soon to renew its full activity. The Sanford Truck factory, the plant of the Watson Products Corp., at Canastota, and the Oberdorfer Brass Co., which manufactures large quantities of aluminum automobile castings, have not felt the depression to any marked degree.

Stockholders Seek Check on Standard

File Application in Cleveland to Restrain Carrying Out of Refinancing Plan

CLEVELAND, Aug. 25—L. B. H. Perlman of New York and other stockholders of the Standard Parts Co. filed an application in Federal Court here yesterday to restrain the corporation from issuing \$8,000,000 in notes recently authorized by the shareholders.

Another suit filed in Common Pleas Court by the same plaintiffs seeks the return to the treasury of 50,000 shares of stock which it is alleged were issued illegally, without proper compensation.

The suits follow rumblings of discontent with the management on the part of a minority of the stockholders who have not been entirely satisfied with conditions since the reorganization of the company which marked the retirement of Christian Girl in February.

Plans for the permanent financing of the company were announced early this month. A week later the shareholders increased the company's capitalization by issuing new notes and deferring the purchase of preferred stock for a period of five years.

In order to retire \$6,000,000 of 7 per cent six months' notes due Sept. 5, the stockholders voted to put out a new issue of \$8,000,000 in 8 per cent notes, payable in five years. It is the issuance of these notes which the plaintiffs seek to prevent. The balance of \$2,000,000 which would remain after payment of the present notes would be used to make some factory changes and to finance current business.

In addition the shareholders at the meeting authorized the directors to issue 80,000 shares of no par value besides changing the outstanding common stock with a par value of \$12,302,631 to stock of no par value. The holders of preferred stock voted to forego the repurchase option and defer sinking fund purchases for five years. Heretofore the sinking fund has been taking up 5 per cent of the preferred stock each year. The second suit strongly objects to the new stock issue on the ground that the stockholders will not profit from it as they should.

Losses Due to Strike

The notes were to be secured by a first mortgage on the fixed assets of the company and by a pledge of the common stock of the Bock Bearing Co. Much of the losses suffered by the company last year were incurred by Girl in fighting successfully a strike at the plant of the Bock Bearing Co.

The plaintiffs contend that the 50,000 shares were delivered to Eaton and the trustees of the Eaton Axle Co. in consideration of its merger with Standard Parts. It is alleged that at the time of the merger Eaton Axle had no properties of substantial or appreciable value

and that under the terms of the agreement Eaton was held to certain obligations which he has failed to perform. Under these circumstances, it is asserted, issuance of the stock constitutes a fraud upon the corporation and the stockholders. The complaint asserts that Eaton's salary as president of Standard Parts was fixed at \$34,000 a year.

Stockholders were told at the Cleveland meeting that the company is prosperous and that if the financing plan went through it would be fortified for increased business. A profit of \$788,000 was reported for the four months from March to June inclusive.

Refinancing Just Announced

J. O. Eaton, president of the Eaton Axle Co., which was formed in Cleveland this year, succeeded Girl as president and general manager of Standard Parts. Coincident with his election came announcement of a reorganization of Standard Parts by acquisition of a substantial interest in the Eaton Axle Co.

Under the reorganization, which was carried through by a syndicate of Cleveland financiers, the capital was raised to \$25,000,000. The company is now operated in five main divisions, the Standard Welding, the Perfection Spring, the Eaton Axle, the Bock Bearing and the Vehicle division.

After his retirement from the Standard Parts, Girl purchased the Kalamazoo Spring Co., Kalamazoo, Mich., which he has renamed the C-G Spring Co.

Ohio Orders Priorities for Road Materials

COLUMBUS, Aug. 21—All railroads in Ohio have been ordered by the Ohio Utilities Commission to give priority immediately to the transportation of road building material and machinery for highway improvement. Cars must be assigned forthwith so that orders for such materials can be filled. This action was taken at the behest of the Ohio Highway Commission, who informed the commission that the welfare of the State demanded the movement of road building materials and machinery. It is estimated that the State would have spent more than \$1,000,000 up to this time this year if transportation had been afforded.

Embargoes on road material, while never officially proclaimed, have been exercised by railroads throughout the country following the issuance of coal priority orders by the Interstate Commerce Commission.

CEYLON TO HOLD EXHIBIT

NEW YORK, Aug. 25—A syndicate has been formed in Ceylon under the name of the Ceylon Motor Show Syndicate for the purpose of holding a motor show there from Jan. 22 to 29, 1921. Information has been received here to the effect that the syndicate has asked the aid of several automotive organizations in Great Britain—the Society of Motor Manufacturers, the Motor Traders' Association and the Imperial Transport Council—to aid in promoting the proposed showing.

Bethlehem Motors Receiver Appointed

Bankers Act Without Consulting Merchandise Creditors with \$600,000 Claims

PHILADELPHIA, Aug. 25—Merchandise creditors of the Bethlehem Motors Corp., with plants at Allentown and Pottstown, Pa., are somewhat indignant because they were not given an adequate opportunity to voice their opposition to the application for a receivership which was granted in Federal court here to-day by Judge Dickinson. The petition for a receiver was granted on a bill in equity filed by Keck & Bros., Allentown, on a claim of \$26,306 for lumber. The company did not demur.

The merchandise creditors, whose claims aggregate \$600,000, did not know until noon yesterday that the bank creditors, with claims totaling \$1,700,000, had decided to ask for a receiver. As soon as this information was received, counsel for the Motor and Accessory Manufacturers' Association communicated with the attorneys for the bank interests and asked that action be deferred. This request was denied, although assurance was given that virtually all the parts and accessory makers would be willing to grant an extension of time on their bills in the hope that the company could be brought safely through its troubles by a creditors' committee.

An announcement was made late last week that a meeting of creditors would be held here this week to decide upon a reorganization program. No date was set, however, no general letters sent to creditors and no intimation given that a receiver would be asked.

Clinton Woods, who has been general manager of the company since last May, was named receiver by Judge Dickinson, with authority to continue business.

The company filed an answer to the petition, admitting that it was unable to pay the bill of Keck & Bros. and assenting to a receivership. Its difficulties were said to be due to lack of working capital and cash to meet maturing obligations. As a consequence, the answer said, a receivership was the only course.

Company Declared Solvent

It was alleged by counsel of both the creditors and the corporation that the company is solvent. Its assets were estimated at \$4,900,000 and its liabilities at \$3,000,000. It owes \$1,700,000 to banks in New York, Chicago and Boston. The banks asserted that \$1,300,000 of this sum is virtually unsecured. Counsel said too much capital had been used in the direction of the plant and not enough devoted to proper operation. The company employs about 1000 men, many of whom are stockholders.

Reorganization of the company, with issues of new stock, is believed to be contemplated by the banks. It is inti-

(Continued on next page)

Light Cars Favored by British Buyers

Business Slack Until After Show
in November—Army Trucks
Await Market

NEW YORK, Aug. 25—Joseph A. Mackle of London has arrived in the United States on the Aquitania for a quick investigation of automotive conditions here. Mackle until recently was general manager of the Willys-Overland business in the United Kingdom and now heads his own company, which distributes Jordan cars.

Business conditions in England have shown a marked slowing up since July 1, he said, heavy taxation and bad weather conditions having added to the general deflation, symptoms of which have been present here. Though Mackle gives it as his opinion that business will revive to a considerable degree once the 1921 contracts are closed, which in England is a September-October job, he does not visualize any boom periods prior to the annual show in November. Business is going to require much more work than in the past, he declared.

Mackle believes the market for high-priced American cars (over \$3,000) is too small to amount to anything and that such cars as the Jordan and Hudson represent the top limit of successful cars for the European market. The Jordan, he says, has taken hold because of its light weight and economical fuel consumption. These two points are now exacted, he said, by European car owners.

There is still a large market for light 4-passenger cars, 4-cylinder, 3 x 4 in., 100-in. wheelbase, 1600 to 1700 lb. all on. Makers of cars meeting these specifications will be sought out by Mackle with a view to arranging for representation.

The truck market is not good. There are thousands of war trucks still unsold, Mackle said, in addition to many thousands in dealers' hands. It will be six to twelve months before these are digested. Ultimately it will be found that these war trucks have served a useful purpose in having widened the field and converted to motor transport many classes of users who, without the incentive of low prices, would have been content with the older methods of haulage. For the present, Mackle advised, England offers no market for American trucks.

Directors Work Out Body Merger Details

NEW YORK, Aug. 25—Details of the merger of the Hale & Kilburn Co. of Philadelphia and the Wadsworth Mfg. Co. of Detroit into the American Motor Body Corp., which will be controlled by American Can Co. and Chase National Bank interests, have not been worked out, it was said to-day. There is no doubt the merger will go through, however. Formal action on it will be taken

Traction Engine Exports for June

Countries	Gasoline 473		Steam 478		Kerosene 474	
	Number	Dollars	Number	Dollars	Number	Dollars
Belgium.....	4	16,062	..	..	27	25,424
Bulgaria.....	13	10,970	..	..	..	..
France.....	132	118,455	..	..	14	18,386
Greece.....	8	7,529	..	..	..	..
Hungary.....	..	..	..	..	1	970
Italy.....	8	6,200	..	..	..	..
Norway.....	5	6,648	..	..	..	..
Portugal.....	..	..	..	..	6	5,720
Spain.....	76	79,320	..	..	11	12,696
Sweden.....	27	43,382	28	32,917	..	..
Turkey in Europe.....	1	970	..	..	..	..
England.....	79	62,710	..	..	..	..
British Honduras.....	..	..	..	..	2	265
Canada.....	655	518,384	2	800	588	537,622
Costa Rica.....	6	5,759	..	..	..	..
Honduras.....	..	..	3	13,318	..	..
Salvador.....	1	844	..	..	..	..
Mexico.....	11	13,267	1	6,155	6	19,701
Jamaica.....	3	2,355	..	..	..	..
Cuba.....	35	25,027	..	..	50	47,763
Dominican Republic.....	..	..	..	..	2	6,724
Argentina.....	57	49,810	3	7,150	76	80,463
Brazil.....	4	3,810	..	..	23	24,659
Chile.....	28	39,372	..	..	1	2,470
Colombia.....	6	18,325	..	..	..	..
Ecuador.....	1	1,672	..	..	..	..
Paraguay.....	..	..	..	..	1	250
Peru.....	100	82,525	..	..	..	..
Venezuela.....	8	6,604	..	..	..	..
China.....	..	..	..	..	23	3,247
British India.....	7	12,809	..	..	6	1,203
Straits Settlements.....	20	40,463	1	4,629	..	..
Dutch East Indies.....	49	54,592	..	..	2	5,030
Hongkong.....	..	..	..	..	1	108
Japan.....	10	21,557	..	..	..	..
Australia.....	15	24,366	..	..	22	4,481
New Zealand.....	13	12,145	..	..	..	..
Philippine Islands.....	163	175,663	7	7,812	9	14,894
British West Africa.....	4	23,028	..	..	..	..
British South Africa.....	87	63,795	..	..	..	..
British East Africa.....	..	..	..	..	2	1,940
Egypt.....	8	2,818	..	..	..	..
Total.....	1,644	1,551,236	45	72,781	873	814,016

Friday by the stockholders of Hale & Kilburn.

It can be stated that operations will be continued in both plants and steps will be made to expand the business. The Willys companies have been among the largest customers of Hale & Kilburn. Both the American Can Co., which will be represented in the new company by J. R. Harbeck, and the Chase bank, are interested in the Willys enterprises.

The American Motor Body Corp. will have an authorized capital of \$20,000,000, consisting of \$15,000,000 Class A 8 per cent preferred stock and \$5,000,000 Class B. Of the Class A stock, \$9,960,200 has been issued and of the Class B, \$4,750,000. Total current assets of the new company will be \$9,718,500, of which \$4,105,000 is in cash. Current liabilities are \$3,048,180, including \$2,250,000 bonds and notes of Hale & Kilburn.

Hale & Kilburn have been in operation more than 60 years. It has been a leader in the development of metal work for interior fittings.

POSTPONE ROAD IMPACT TESTS

NEW YORK, Aug. 26—Prof. T. R. Agg, chairman of the National Research Council, has notified the National Automobile Chamber of Commerce that the road impact tests which were to have been held at Columbus, Ohio, beginning Sept. 1 have been postponed because the gasoline consumption testing apparatus will not be completed by that date.

Bethlehem Motors Receiver Appointed

(Continued from preceding page)

mated that the merchandise creditors will insist upon having representation upon whatever committee is named to work out the details of refinancing and reorganization.

Arthur T. Murray became president of Bethlehem Motors upon its organization in 1916. He retired some time later to become president of the American Bosch Magneto Co., after that corporation was taken over from its German owners by the Alien Property Custodian and reorganized. Hi Harris took Murray's place as president of Bethlehem, but he left a couple of months ago and Murray again took the helm.

A new company was incorporated in Delaware in 1919 to take over the New York corporation of the same name and the North American Motors Co. of Pottstown. The old officers were retained.

The main plant of the company is located at East Allentown and has a capacity of more than 6000 motor trucks a year. Extensive additions have been made in the last few months. The company had developed a light passenger car designed chiefly for export and has been doing experimental work on a new design of motor bus. The establishment of motor bus lines was to be fostered throughout the country and field men already are at work along this line.

INDUSTRIAL NOTES

The Fairbanks Co. has taken over the exclusive sale and distribution in the United States and foreign countries of the Marvel cylinder reboring machine, manufactured by the Marvel Machinery Co. of Minneapolis. The Marvel company has decided to expand the production of its Marco finished and semi-finished replacement pistons and for this purpose has recently purchased several acres of ground in Minneapolis upon which to erect a modern factory. New machinery for the plant already has been ordered.

Simplex Vacuum Mfg. Co. has been consolidated with S. C. Simon & Co. under the presidency of S. C. Simon, who took over the Vacuum company some time ago as a side line. The offices and shipping rooms have been removed to 825 North Second Street, Philadelphia, and the factory is located at 1729 North Phillip Street. The company manufactures vacuum specialties.

The Pouvaillsmith Corp., Poughkeepsie, which manufactures a line of steering wheels and Bakelite products, is about to manufacture a line of Bakelite gasoline tank caps on which it will be in production about Oct. 15. The caps will consist of a Bakelite top with a brass threaded piece. The line will be prepared first for the jobbing trade.

A. Boyriven, Paris, manufacturers of automotive body linings and novelty fittings, has opened a New York branch at 225 West Fifty-seventh Street under the management of C. S. de Got.

American Malleables Co. has removed its general sales offices from the plant at Lancaster, N. Y., to Detroit. Vice-president P. G. Smith will be in charge.

Automotive Products Co., Hazleton, Pa., has put its plant on a 24-hour schedule turning out parts for Ford automobiles on a large contract.

C. A. Fair Carriage & Automobile Works, Harrisburg, Pa., has moved into a new building which will permit of enlarged production.

WOULD RESTRAIN FORD LEASE

NEW YORK, Aug. 23—Two minority stockholders of the Detroit, Toledo & Ironton Railroad, recently acquired by Henry Ford through the purchase of 90 per cent of the stock, have begun suit in the State Supreme Court to prevent the consummation of a lease for 75 years to the Fords. The plaintiffs, Leon Tanenbaum and Benjamin M. Strauss, allege that under the terms of the lease the railroad will receive an entirely inadequate rental. They also assert that it will bring insolvency because both mortgages will fall due before the expiration of the lease.

Ford Plans Improvements

DETROIT, Aug. 23—Plans for extensive improvements to the rolling stock and roadbed of the D. T. & I. railroad when Henry Ford takes charge Sept. 1 are being formulated. The roadbed will be regraded practically the entire length and a heavier type of steel rails will supplant those now in use. Contracts for \$500,000 worth of new rails for immediate delivery were let two weeks ago. Rehabilitation of the railroad will work to the distinct advantage of all industries in Detroit both in the matter of fuel

shipments, inbound and outbound freight. The D. T. & I. crosses several trunk lines and will aid materially in keeping down congestion in Detroit and Michigan.

Kentucky Wagon Plans
\$1,000,000 Addition

LOUISVILLE, Aug. 20—Through a real estate deal consummated between the Kentucky Wagon Mfg. Co., the Louisville Industrial School Board, Board of Park Commissioners and Board of Public Works, the wagon company, through its president, R. V. Board, came into the ownership of eighteen acres of property on Eastern Parkway, south of the Southern railroad tracks.

On the new site, which cost approximately \$50,000, buildings and extensions to the present plant will be erected involving the employment of over 1000 men and an expenditure of close to \$1,000,000. Work on the new addition will be started within the next two years, it was announced, or as soon as the prices on building material show a decline.

Board said the addition will be used exclusively for the manufacture of automobiles, motor trucks and accessories.

When asked if the name of wagon works would be changed or the manufacture of wagons discontinued, Board replied:

"No, indeed. We are making wagons now at the rate of one every fifty minutes and the orders for them are taxing our capacity. So why discontinue the manufacture as long as the demand exists?"

The acquirement of the new property will make the wagon works plant cover a shop space of about sixty-seven acres, with a working force of 1900 men.

PIERCE-ARROW TRUCK PRICES

BUFFALO, Aug. 21—Prices on the new truck models and special equipment of the Pierce-Arrow Motor Car Co. have been announced as follows: 2-ton with lazy back seat and regular equipment, \$3,750; 3½-ton, similarly equipped, \$4,950; 5-ton, \$5,700. Cab with fore doors and windshield, \$150. Starting equipment, including starting motor, switch, gear ring and larger battery (120 ampere-hour), \$125. This is an increase in price of \$200 as compared with the former 5-ton model and a decrease of \$550 as compared with the former 2-ton model. The latter model sold formerly with a cab as standard equipment; now it comes without cab but with electric light.

SHOW NEW ELECTRIC CARS

NEW YORK, Aug. 23—Two new electric vehicles will be seen by the public for the first time at the New York Electrical Exposition in October. They will be the exhibits of the Steinmetz Electric Motor Car Corp. and the Berg Electric Car Co. The former will show both an industrial truck and a commercial vehicle and the latter a passenger car. Both are said to possess new features of design and construction.

METAL MARKETS

AUTOMOTIVE purchasing agents pondering on the plaguey bubbles which are being blown in the pig iron market may do well to heed the reception that has been accorded to these pyrotechnical displays by the steel industry. Although there have so far been no representative sales of pig at the widely heralded \$50 level, sellers of merchant pig iron are asking that figure. At the same time sheet bars have receded to \$70 and billets to \$60 in the Pittsburgh and Youngstown markets. These latter quotations denote decline of \$10 from the values in force a few months ago. Virtually all descriptions of semi-finished steel are easier than they were three months ago. Is it possible that, if there were any justification for such incisive advances as those that are now quoted in the pig iron market, semi-finished steel would not have responded even though only to the extent of a steadier tone? True, most of the steel producers are not dependent for their pig iron supply upon merchant furnaces, but \$50 pig iron, side by side with \$60 billets, is such an incongruity that one or the other must change ere long.

The actual advance in freight rates which became effective today (Aug. 26) amounts to \$1.36 a ton on semi-finished steel shipments from Pittsburgh to Detroit or Toledo. On finished steel the advance on shipments from Pittsburgh to Detroit and Toledo is 9½c. per 100 lb. to the former and 8½c. to the latter destination.

Brokers acting in behalf of foreign sellers of aluminum have been disappointed so far in their expectations that the advances announced by the sole American producer would be followed by an immediate buying movement of foreign metal, which is offered at 2@3c. below the new prices of domestic. Large automotive consumers of aluminum are not in a very receptive frame of mind to these offers of foreign metal, because in the past they have found this supply to be both quantitatively and qualitatively so irregular that it could not be depended upon.

Pig Iron—None of the sales reported to have been made at \$50 exceeded 500 tons, and can therefore not be considered representative. More than 10,000 tons of No. 2 foundry sold in Cleveland a few days ago at an average base of \$46, furnace, for first half 1921 shipment. Furnace coke in Connellsville is down to \$15.50 and foundry to \$18.50.

Steel—Accumulations of automobile sheets at the mills, resulting from a desire to accommodate buyers who had asked that they be held until after inventories had been taken, have dwindled under the influence of the impending freight advance. Premiums on cold finished steel bars, of which the automotive industries consume 60 per cent of the output, have vanished. Independent sheet mills are sold out for many months ahead, wherefor there will be at this time no formal opening of their books, as heretofore customary.

Lead—Recent advances have made it possible to bring lead in from England and, in spite of the duty, undersell American producers. Once the volume of these importations grows out of bounds, prices here will come down or prices in London go up.

Aluminum—European metal is being offered at 3½c. c.i.f. New York, or 32c. duty paid. Automotive buyers appear to be apathetic.

Tin—So far the market shows no evidence of a reawakening of interest on the part of consumers.

Antimony—The rise in silver is reflected in slightly higher values for this metal.

Zinc—The market is steadier, but, for all that, lacks pep.

Copper—The market lies seemingly prone, unable to rise.

FINANCIAL NOTES

E. L. M. Tire & Rubber Co., of Racine, Wis., incorporated recently with a capitalization of \$200,000, has leased a large vacant factory building for a long term and is buying equipment for the manufacture of pneumatic and solid tires, mechanical rubber goods, etc. It is expected that production will be under way by Sept. 1 or 15. The promoters of the enterprise include Laurence McKimm, Otto E. Ahrens and Margaret McKimm, all of Racine.

Mullins Body Corp. reports net profits for July before deduction of Federal taxes of \$134,958, and for the seven months ended July 31, \$747,000. This compares with net profits of \$452,726 for the seven months ended Dec. 31, 1919. Earnings for 1920 are estimated at \$10 a common share.

Hero Mfg. Co., makers of Kennedy Internal Gear Drive Axles, has been placed in receivership pending plans for adequate financing. The company's assets are greatly in excess of its liabilities.

Lion Tire & Rubber Co. has acquired a 10-acre site at New Toronto, Ont., on which it plans to build its new factory. The company is capitalized at \$2,500,000.

Wilson & Housler Co., of Montague, Mich., manufacturers of marine engines, has been placed in the control of the Grand Rapids Trust Co. as receiver.

Timken-Detroit Axle Co. has declared a quarterly dividend of 1¼ per cent on preferred stock payable Sept. 1.

Detroit Valve and Fittings and Detroit Brass Works has changed its name to the Detroit Malleable Works.

Owen Tire & Rubber Co. stockholders will hold an annual meeting in Cleveland Sept. 14 for the election of new directors.

White Motor Co. has declared a quarterly dividend of \$1 payable Sept. 30.

Globe Rubber Tire Mfg. Co. has declared a stock dividend of 10 per cent.

National Can Co. has increased its capital from \$500,000 to \$1,000,000.

Receivers Appointed for Owen-Magnetic

WILMINGTON, DEL., Aug. 21—Upon petition of Uri W. Hungerford of New York, creditor and stockholder, receivers were appointed to-day for the Owen Magnetic Motor Car Corp., which has a plant at Wilkes-Barre, Pa., but is a Delaware corporation. The receivers named were Charles F. Ross, New York; Robert Pennington, Wilmington, and James Harris of Wilkes-Barre. The company has outstanding 3058 shares of preferred stock of \$100 par value, 6000 shares of second preferred of \$100 par value and 5000 shares of common of no par value.

The plant and equipment of the company are valued at \$347,143. This does not include the interests of R. M. Owen and the license for the manufacture of Entz transmissions. The cash in the bank is listed at \$5,000 and accounts receivable at the same amount. The liabilities are given as \$300,000, with \$235,000 notes payable. The receivership petition was made with the consent

of the company and in the interests of all the creditors.

The financial difficulties of the company are attributed to the general financial and transportation conditions. Certain banks which had promised funds to carry on operations failed to provide them and the company was unable to get shipments of materials needed to complete cars. It is hoped that continued operation may be possible under the receivership, although the plant at Wilkes-Barre now is closed.

Knight Metal Products Assigns to Creditors

DETROIT, Aug. 20—Knight Metal Products Co., a subsidiary of Knight Metal Products, Ltd., of Toronto, made an assignment to the Detroit Trust Co. for the benefit of its creditors. Liabilities are approximately \$350,000, with assets of \$12,000. Of the liabilities \$225,000 represents the sum due one of the stockholders for patent rights on the McGill autopower attachment for Ford cars.

The company was incorporated a year ago under a Michigan charter with \$500,000 capital stock. The patent apparently did not meet with the favor expected and the plant has been operating at a loss since it started last October until it ceased about a month ago. All of the officers of the company are Toronto men and H. W. Knight, vice-president, has been in charge of affairs in the Detroit plant.

What action the trust company, as trustee, will take in settling the affairs of the concern has not been determined. It is stated, however, no attempt will be made to operate the plant and the physical assets and patent rights will be sold for the benefit of creditors or an agreement may be reached whereby the patent rights may be returned to liquidate the \$225,000 debt and the physical assets disposed of and the proceeds applied to the commercial liabilities.

KISSEL INCREASES CAPITAL

HARTFORD, WIS., Aug. 23—The authorized capitalization of the Kissel Motor Car Co. of Hartford, Wis., has been increased from \$1,000,000 to \$2,100,000. The new issue is made for the purpose of accommodating the growth of the business and extensions of the plant in the last few months, as well as to finance increased production. The Kissel company is one of the oldest makers of passenger and commercial cars in the Middle West, having engaged in the manufacture of motor vehicles more than 15 years ago.

BARLEY SHIPS CLOSED CARS

KALAMAZOO, MICH., Aug. 23—Barley Motor Car Co. has started special production on its line of closed Roamers and is making weekly shipments to distributors in anticipation of fall business. The only changes noted in the design are body refinements worked out by the engineering department.

Bank Credits

Written exclusively for AUTOMOTIVE INDUSTRIES by the Guaranty Trust Co., second largest bank in America.

NEW YORK, Aug. 25—The improving transportation situation should have a beneficial effect upon the banks' ability to meet the requirements of the advancing crop-moving period. Liquidation of loans has, in fact, already been reported in the Kansas City district. The crop situation continues good, with weather favorable to the harvesting of grain and the ripening of corn. Many wholesale prices show a continued downward tendency.

The call money market last week was quiet, with the ruling rate at 7 per cent. The range was from 7 per cent to 9 per cent, as compared with 6 per cent to 8 per cent the previous week. The nominal rates for time money remained unchanged, with little activity in that field and no indication of an increase in the available supply.

The weekly statement of the Clearing House members continues to reflect the effects of the crop-moving demands upon credit. The Clearing House institutions show a decreased excess of reserves over the legal requirements. The excess reserve on Saturday was but \$1,428,530, following a decrease of \$17,147,280 from the previous week. Continued withdrawals for the interior are indicated by the decline in net demand deposits of \$33,089,000. Cash in the vaults of members declined \$4,330,000. On the other hand, the bills payable declined \$31,214,000 from the record high of \$1,157,805,000 of the week before.

The Federal Reserve Banks show a less favorable technical position than for the previous week. Net deposits increased \$6,866,000, and Federal Reserve notes in actual circulation were larger by \$5,544,000. Bills discounted secured by Government war obligations increased \$4,628,000, while total bills discounted increased \$30,402,000. Cash reserves declined \$11,048,000. The ratio of gold reserves to Federal Reserve notes in circulation, after setting aside 35 per cent against net deposits, declined accordingly from 48.6 per cent to 48.1 per cent. Total earning assets increased, in the same period, by \$29,723,000.

LORAIN TRUCK IN PRODUCTION

LORAIN, OHIO, Aug. 25—The Lorain Motor Truck Co., this city, is now in production on its 2-ton J and J truck, the first model built since its organization the early part of this year. The present factory includes two buildings with a floor space of over 10,000 sq. ft. When the new addition is completed it will be doubled. Production is now at the rate of two trucks a day.

J. C. Hayes is president; M. J. Henninger, vice-president; L. J. Henninger, secretary; H. T. Jackson, treasurer, and E. C. Juergens, designing engineer and general manager.

The new truck costs \$3,250 and is made up of standard units.

Men of the Industry

H. F. Wardwell was elected president of the Briscoe Motors Corp., to succeed F. Cowin, at a meeting in New York. Wardwell was formerly a railroad executive, but for the past few years has been president of the Burnside steel company. Assuming the new position Wardwell said few changes if any were expected in the personnel of the Briscoe organization. It is planned to increase production at the factory.

H. C. Smith has been appointed manager of the western district by the Mason Tire & Rubber Co. and Earl W. McCreery has been placed in charge of the eastern territory. Both men have had long experience in the tire business. The Mason company has appointed W. S. Deamud manager of its Kansas City branch to succeed Smith.

W. R. De Voe, assistant sales manager of the Briscoe Motor Corp., has resigned to become a partner in the firm of Miller & De Voe, which will distribute the Briscoe line in western and southern Michigan and northern Indiana. Neil Cowham has been appointed to succeed De Voe in the Briscoe organization.

D. B. Williams has been appointed advertising manager of the Handley-Knight Motors Co., Kalamazoo, Mich. Williams was formerly New Orleans branch manager for Chevrolet, and has been connected with other firms in the automotive industry since 1909.

J. F. Renick has been appointed sales manager of the Kansas City branch of the Pyrene Mfg. Co. Formerly he was in charge of special work in the fire protection division of the Johns-Manville Co. St. Louis branch.

Arthur H. Blanchard, professor of highway engineering and highway transport at the University of Michigan, has been appointed consulting engineer to the Michigan State Highway Department.

C. H. Mohr has been added to the staff of the Perkins-Le Noir Co., Baltimore, representative in that territory for Roller-Smith Co. and other automotive and engineering companies.

J. H. Barnett, advertising manager of the Martin-Parry Co., has resigned to take charge of advertising for Robert H. Hassler, Inc., manufacturer of shock absorbers.

W. J. McIntyre has resigned from the Splitdorf Electrical Co. sales force to represent the Van Sicklen Speedometer Co. in the Cleveland and Eastern territory.

George B. Hodges has been appointed manager of the industrial and production department of the McVicker Engineering Co., Minneapolis.

E. S. Foljambe has joined the Goodyear Tire & Rubber Co. of California as a special representative in the motor truck tire department.

P. K. Coe has been appointed manager of the aeronautic department established by the Goodyear Tire & Rubber Co. of California.

MERTZANOFF JOINS SIMMS

ATLANTA, Aug. 23—An influx of export orders for the new Simms car to be manufactured in Atlanta by the Simms Motor Car Corp. has resulted in the appointment of C. E. Mertznanoff as export manager for the company to handle foreign trade orders exclusively. Mertznanoff was formerly export manager for the Mitchell Motor Co. and spent several days in Atlanta recently conferring with

officials of the Simms corporation. He has returned to New York, where the company will maintain its export offices.

Receivers Appointed for Small Company

INDIANAPOLIS, Aug. 25—At the request of William Small, president of the William Small Co., manufacturers of the Monroe car, Judge Theophilus J. Moll of Superior Court, to-day appointed Reiley C. Adams, president of the Security Trust Co., and Hugh Dunning, factory manager, receivers of the Small company. The receivers will continue to operate the plant.

In his application for a receivership, Small set forth that the company owes approximately \$900,000 to merchandise and bank creditors and that it has not enough quick assets to meet these obligations, although there are enough orders on the books to keep the factory busy for a long time to come.

The application for a receivership came as a surprise, for the affairs of the corporation have been in the hands of a creditors committee for the past few weeks and it was believed a plan could be worked out which would permit a satisfactory settlement with all creditors and save the company. Under this proposal funds would have been provided for the completion of a large number of cars for which orders had been received.

PAGE HEADS SAXON SALES

DETROIT, Aug. 20—Carl H. Page, head of the Carl H. Page Co., New York, distributor of Chalmers and Jordan cars, and one of the best known men in the merchandising field, has been made director of sales, service and advertising for the Saxon Motor Car Co. C. L. Fox, sales manager, resigned to enter other business, but has not announced his plans. While Page will have full charge of the three departments, M. A. Hollinshead will continue as advertising manager, J. H. Hickey as service manager, and C. P. Hennessy, assistant sales manager, becomes sales manager. C. E. Jacobs is acting chief engineer in place of W. H. Radford, who resigned some time ago. Fred Wilkins is production manager in place of H. S. Lee, also resigned. In the acquisition of Page the company is considered very fortunate. His experience dates back to the early days of the automobile and he is especially well known in the Eastern territory.

N. I. V. A. CONVENTION SET

CHICAGO, Aug. 21—Plans are being perfected by the National Implement & Vehicle Association with headquarters in this city for the twenty-seventh annual convention to be held at the Hotel Tray-

more, Atlantic City, Oct. 20-22. Among the speakers will be J. R. Howard, president of the American Farm Bureau Association, and George W. Collins, president of the National Federation of Implement & Vehicle Dealers Association. There will also be present a representative of the American Bankers Association, who will speak on finances. Questions on transportation and labor will be discussed by men prominent in both lines. At the banquet, which will conclude the convention, the principal speech will be made by John Fletcher, vice-president of the Fort Dearborn National Bank of Chicago.

Youngstown Bankers See Easing of Credits

YOUNGSTOWN, OHIO, Aug. 23—Steel cancellations in the last two weeks have been largely confined to the automobile trade, according to local authorities who ascribe these cancellations to delay in shipments caused by the rail conditions. Steel operators here say that the transportation situation has improved rapidly within the last week and that traffic conditions by the first of the year will be approximately normal.

The peak of the credit demands for crop movement has been passed, in the opinion of Youngstown bankers and the outlook for the next several months is for increasing easing in the money market. Liquidation of mercantile stocks and manufacturing inventories in several lines, together with lowering of many commodity prices, has effected release of tied-up capital and has required less operating capital. Going essential businesses, bankers here believe, will find it much easier to get needed funds in the next few months, including capital for financing of automobile paper.

IOWA GETS ARMY TRUCKS

DAVENPORT, IOWA, Aug. 20—War equipment valued at \$2,500,000 has been received by the State highway commissioner from the Bureau of Public Roads of the War Department for use in the Iowa State good roads program. The inventory includes three score touring cars, in addition to 400 trucks of various sizes and makes, a score of tractors and miscellaneous material.

"The touring cars are being used to transport field parties in the making of field surveys," says Fred M. White, chief engineer, "and in supervision of road improvement on the State road system. Approximately all of the trucks have been transferred to counties and are being used by them in transporting materials for highway work. The remainder are being retained by the commission as part of its reserve fleet."

SWISS TRACTOR SHOW DELAYED

NEW YORK, Aug. 25—The recently announced tractor competition to be held at Latigny, near Geneva, Switzerland, according to information reaching here, has been postponed because of the prevalence of the foot-and-mouth disease.

Calendar

SHOWS

Aug. 28-Sept. 11—Toronto, Canada, National Automobile Show, Automotive Industries of Canada, in connection with Canadian National Exhibition, Exhibition City.

Aug. 30-Sept. 4—Milwaukee, Annual Automobile Show in conjunction with Wisconsin State Fair.

Sept. 6-11—Indianapolis, Twentieth Annual Fall Automobile Show in connection with Indiana State Fair.

Sept. 18-25—Cincinnati, Annual Automobile Show, Passenger cars only, Cincinnati Automobile Dealers' Ass'n. Music Hall Buildings.

Sept. 20-26—Los Angeles, National Tractor and Implement Show of the West, Tractor and Implement Dealers' Ass'n of Southern California, Guy H. Hall, Mgr.

Sept. 27-Oct. 2—Buffalo, Closed

Car Show, Buffalo Automotive Dealers' Ass'n, Elwood Music Hall, C. C. Proctor, Mgr.

Oct. 6-16—New York, Electrical Show, Grand Central Palace, George F. Parker, Manager.

Nov. 14-21—New York, Automobile Salon, Commodore Hotel Ballroom.

Nov. 15-20—Chicago, Automotive Equipment Show, Coliseum, Automotive Equipment Association.

Dec. 10-18—New York, Motor Boat Show, Grand Central Palace.

Jan. 8-15—New York, National Passenger Car Show, Grand Central Palace, Auspices of N.A.C.C.

Jan. 29-Feb. 4—Chicago, National Passenger Car Show, Coliseum, Auspices of N.A.C.C.

Feb. 6-12—Columbus, National Tractor Show, Columbus Tractor & Implement Club, Ohio State Fair Grounds.

FOREIGN SHOWS

Sept. 4-25—London, Machine Tool and Engineering Exhibition, Machine Tool Trade Ass'n, Inc., Olympia.

October—London, Commercial Vehicle Show, Olympia.

Nov. 4-13—London, International Motor Exhibition, Society Motor Mfr's and Traders, Ltd., Olympia and White City.

Nov. 29-Dec. 4—London, Cycle and Motorcycle Show, Cycle and Motorcycle Mfr's and Traders Union, Ltd., Olympia.

Jan. 7—Sydney, Australian Motor Show.

CONTESTS

Sept. 5—Targa Florio Race, Sicily.

Sept. 6—Hornell, N. Y. Dirt track.

Sept. 6—Cincinnati, O. Speedway.

Sept. 6—Uniontown, Pa. Speedway.

Sept. 17-18—Syracuse, N. Y. Dirt track.

Sept. 25—Allentown, Pa. Dirt track.

Oct. 1-2—Trenton, N. J. Dirt track.

Oct. 8-9—Danbury, Conn. Dirt track.

CONVENTIONS

Sept. 1-3—Chicago, Thirteenth Annual Convention National Gas Engine Ass'n. Congress Hotel.

Sept. 2—Cleveland, Trailer Manufacturer's Association of America.

Sept. 16-17—Cleveland, Motor and Accessory Manufacturers' Ass'n. Credit Convention.

Oct. 11-13—Chicago, National Association of Purchasing Agents' Annual Convention.

Dec. 7-10—New York, Annual meeting American Society of Mechanical Engineers. Engineering Societies Building.

Jan. 11-13—S. A. E. Annual Meeting, New York City.

British Buses to Pay Mileage for Road Keep

LONDON, Aug. 6 (*Special Correspondence*)—The British Ministry of Transport has endorsed the action of a local authority which made it a condition antecedent to being allowed a license to run motor buses on the local roads, that they should agree to pay a rate of 4 cents per vehicle-mile for road upkeep. The matter will be reviewed again when certain legislation comes to be discussed.

Meanwhile this decision has been adversely received in motor circles, though why is not clear, seeing that recent data shows a marked saving of road motor traffic costs compared with present railroad rates, which will be greater after Sept. 1, when the further increase will be operating.

A four-ton truck or motor-bus with the four cents road tax added will cost 1 cent per ton-mile and in the case of a motor brake or single deck motor bus seating 30 people and weighing gross 4 tons, the charge will be a mere fraction added to the fares. On the other hand, the amassed sum will help to swell the yearly income of \$40,000,000 required to fit or maintain the public roads.

PERFEX RADIATOR UNDER PROBE

RACINE, WIS., Aug. 23—The attorney general of Wisconsin has begun an exhaustive investigation of records of the Perfex Radiator Co. of this city in response to complaints from persons who claim to have purchased stock but have not received certificates. The affairs of the company are in the courts at Racine. It is charged that orders of the State Public Utilities Commission relative to price charged for stock and commissions to be paid fiscal agents were ignored. The stock was placed in the hands of the Bullock-Malcolm Co., St. Paul, to be sold at \$12.50 per share. It is charged that

shares were sold at from \$17 to \$20 per share on statements that the company would declare dividends of 14 per cent. The Bullock-Malcolm Co. has declined to come into the Racine courts to show what became of all stock sold or the amount received per share.

Ohio Steel Products to Start in October

YOUNGSTOWN, OHIO, Aug. 23—Production of from ten million to fifteen million feet annually of high grade steel tubing for automobile uses is provided for in the new plants of the Ohio Steel Products Co., Mineral Ridge, Ohio, according to announcement this week by John A. Logan, vice-president and general manager, in connection with the completion of arrangements for financing the plant. Enameled and galvanized conduit pipe and steel tubing will be the chief product.

This company was formed a year ago, backed entirely by Youngstown capital. Construction was begun last November. Transportation and material difficulties and labor troubles sent the construction cost mounting and prevented completion of the plant in time to fill some orders that had been received. This made necessary additional capital and an operating and financial arrangement was entered into with the Huron Steel Co. of Cleveland. F. W. Mettler, president of Huron, succeeds Logan as president of the Ohio Steel Products Co. Operations are expected to be under way Oct. 1.

WILLYS BUYS WESTON PLANT

WESTON, ONT., Aug. 23—The Willys-Overland Motor Co. has purchased the buildings and four and a half acre site of the Roman Stone Co. here. It is understood the buildings, which contain 40,000 square feet, will be occupied by the Moline Plow Co., which is establishing a branch in Canada.

Aircraft Indemnities Still to Be Figured

LONDON, Aug. 6 (*Special Correspondence*)—In the lower house of the British Legislature the Prime Minister, in reply to a member who inquired whether the British Government has agreed to indemnify the Government of the United States against claims by British subjects against the United States Government in respect to its use during the war of British patents and other proprietary rights relating to aircraft; whether any reciprocal liability has been undertaken by the United States Government towards the British Government, and what is the estimated or ascertained measure of the financial liability of the British Government under this indemnity;—said that:

The British Government had accepted certain responsibilities and the American Government had given certain undertakings. The extent of the liability to be accepted by both Governments still formed the subject of consideration. The financial aspect of the matter could not at present be gauged, as the responsibility of the respective Governments had not been clearly defined, and the claims to be dealt with thereunder had not yet been investigated.

CHANDLER EARNINGS GROW

NEW YORK, Aug. 23—The regular quarterly dividend of \$2.50 a share has been declared by the Chandler Motor Car Co., payable Oct. 1 to stock of record Sept. 10. This is upon an increased amount of stock. The July earnings were \$1,193,000 and the seven months earnings, both figures being before taxes were \$6,414,000, which compares with \$5,621,000 for the entire year of 1919. The company has on hand cash and government securities amounting to \$4,500,000 and has no banking or other indebtedness except current bills.